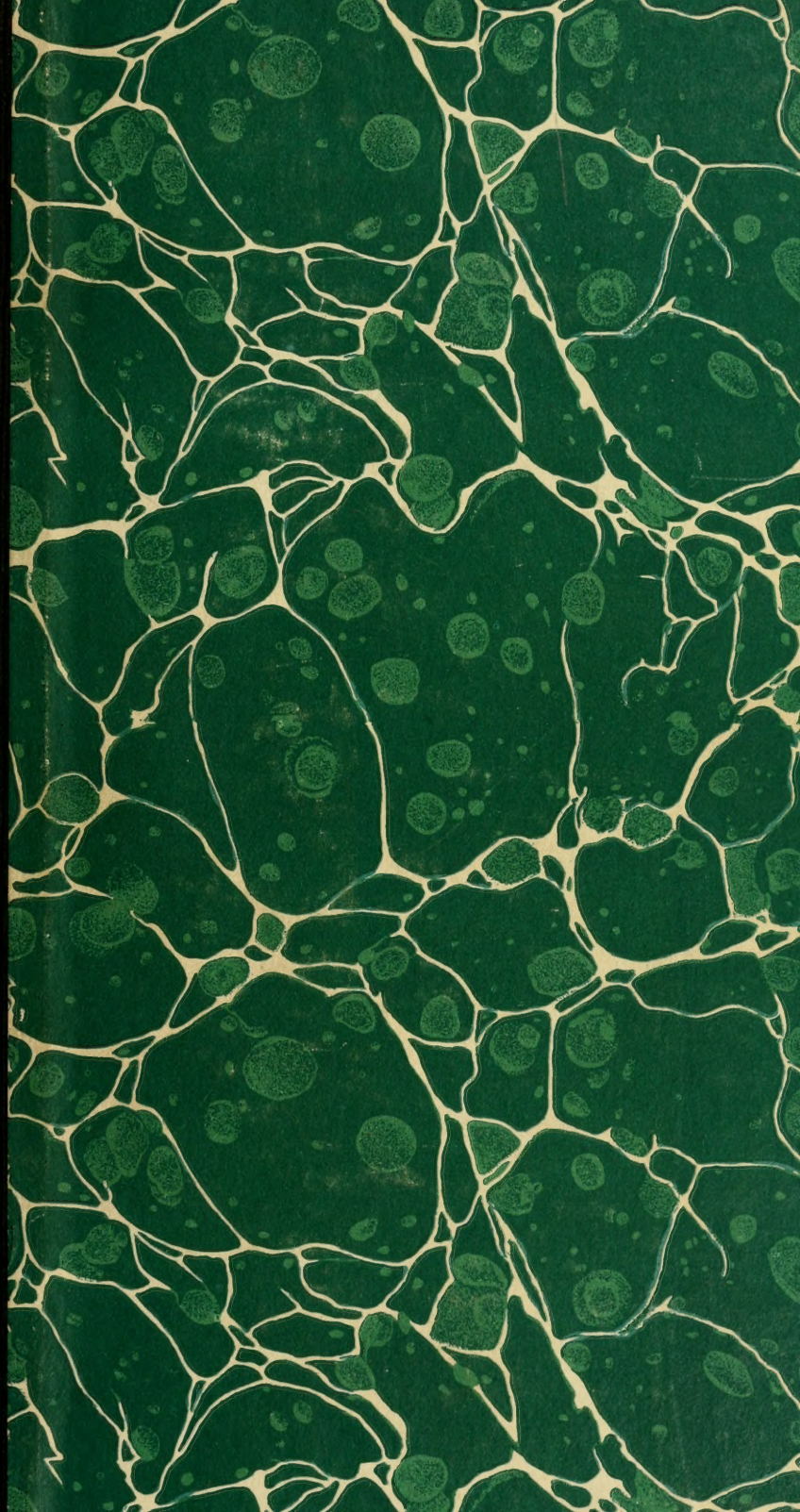




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OF THE
BROOKLYN ENTOMOLOGICAL
SOCIETY

Vol. XXVIII

1933



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J. R. de la TORRE-BUENO

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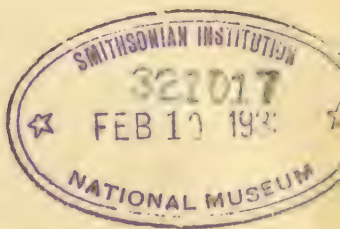
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BROOKLYN ENTOMOLOGICAL
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J. R. de la TORRE-BUENO, Editor

CARL GEO. SIEPMAN

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BULLETIN

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NEW GENERA AND SPECIES OF THYSANOPTERA FROM SOUTH AFRICA.

BY JACOBUS C. FAURE, Pretoria, Union of South Africa.

This paper consists of the descriptions of seven new genera and fourteen new species. The types are on deposit in the entomological collection of the University of Pretoria, Union of South Africa.

It has been my privilege to spend several weeks in the laboratory of Dr. J. Douglas Hood at Rochester, New York, and to see his excellent collection of Thysanoptera; I am greatly indebted to him for many helpful suggestions in connection with the preparation of this paper.

I also express my thanks to Dr. H. Priesner, of Cairo, Egypt, who very kindly gave me his views on the relationships of several of the forms described herein.

Heliothrips sylvanus spec. nov. (Pl. I, Figs. 1, 2.)

Female (macropterous). Length about 1.3 mm. Color blackish brown to black, antennae largely yellow. Head dark brown, yellowish brown between eyes, eyes black, surrounded by yellowish margins. Antenna: I and II brown, III yellow with basal fourth light brown, IV and V yellow, VI yellow in basal half and shaded light brown distally, VII light brown, VIII gray. Mouth cone dark brown. Prothorax like head, blackish brown over coxae; pterothorax blackish brown on sides and on mesonotum, rest yellowish brown. All legs rather uniformly blackish brown. Abdomen dark brown, with blackish brown transverse lines between segments (due to overlapping). Wings greyish yellow, extreme base of fore-wing, and basal half of scale brown.

All parts of body and legs heavily reticulated. Head about as long as wide, and about 1.7 as long as prothorax. Cheeks distinctly concave, head distinctly constricted at extreme base. Eyes large, scarcely bulging, almost half as

long as head, their width about 54μ and their interval about 94μ . Ocelli on a moderately raised hump, posterior pair situated on a line passing just in front of centre of eyes. Sides of vertex not deeply excavated between eyes and ocelli as in *haemorrhoidalis*.

Antennae very similar to those of *haemorrhoidalis*: segment III about 10μ shorter, V not so broadly truncate at apex, VI distinctly narrowed at base, VIII about 10μ shorter. Sense cones as in genotype: III and IV with one each on outer side; V, one short cone on outer side; VI with a very long cone on inner side and a short one on outer side; VII with one of moderate size on outer side. Mouth cone broad and heavy, as in the genotype.

Prothorax slightly more than twice as wide as long, strongly reticulated, sides feebly concave, without spines. Pterothorax about 1.1 as wide as long, sides concave about middle, rounded in front and behind. Wings about eleven times as long as width at middle, costa bearing a few minute setae but no fringe or large setae; anterior and posterior vein each with about 6 minute setae, posterior fringe well developed, but hairs much shorter at apex of wing; hind wing with fringe on posterior margin and a row of setae about 40μ in length on anterior margin. Legs similar to those of genotype, hind tibiae and tarsi together about 40μ shorter. Interval between hind coxae about 88μ , middle coxae about twice as far apart.

Abdomen very similar to that of genotype, except that spines on segment IX are about 20μ longer (*i.e.* they measure about 80μ).

Measurements of holotype (female) in mm.:—Length 1.36 mm.; head length 0.216, width across eyes 0.2, at base 0.208; prothorax length 0.128, width 0.264; pterothorax length 0.296, width 0.344; fore-wing length 0.72, width at base just beyond scale 0.112, at middle 0.064; abdomen length 0.792, width 0.392.

Antenna, length, 0.352.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	20	44	72	56	52	48	12	48
width in μ	32	40	28	24	24	20	8	6

Male (macropterous). Length about 1.1 mm. Smaller than female, but very similar in coloration and structure. Segment VIII of abdomen with 4 setae about 24μ in length on dorsum near caudal margin, and an incomplete comb of about 10 minute spine-like setae on caudal margin. Segment IX with a pair of setae similar to those on VIII situated distad of the middle line of the tergite, and about one-fourth of the width from each lateral margin; a pair of much weaker

setae laterocephalad of these; near the caudal margin four short strong spines close together, the inner pair about 20μ long and about 20μ apart, the outer pair about as long as the inner pair but distinctly weaker; a pair of short setae latero-caudad of the short spines; on a line with the short spines on lateral margins a pair of spines about 40μ in length, on the ventro-caudal angles a pair of curved spines about 48μ in length.

Sternites III to VII of abdomen each with a conspicuous sense-area, transverse, kidney shaped, anterior margin concave, posterior convex, largest area on III, the areas on succeeding segments progressively smaller: the area on III about 96μ wide and 16μ long, that on VII about 64 by 20μ ; the surface of the sense-areas brown, densely pitted with a large number of minute pale dots.

Measurements of allotype (male cleared in NaOH) in mm.:—Length 1.3 mm. Head length 0.184, width 0.176; prothorax length 0.112, width 0.216; pterothorax length 0.28, width 0.28; abdomen length 0.8, width 0.288.

Antenna, length, 0.32 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	20	44	64	48	48	44	12	44
width in μ	28	32	20	20	20	20	8	6

Described from 8 mounted specimens taken by the writer in the Woodbush, Pietersburg district, Transvaal in April 1924 on *Maesa rufescens* A.DC (4 ♀♀ 2 ♂♂) and in sweepings (2 ♀♀).

This interesting form differs strikingly from the genotype *H. haemorrhoidalis* (Bouché) in the dark coloration of the legs, the absence of a fringe on the costal margin of the fore-wings, the longer head, and in the following antennal characters: the different shape of segment VI and the length of segment VIII.

Poethrips gen. nov.

Body moderately long and slender, surface with anastomosing lines of sculpture and minute granulations. Head flattened, longer than wide, and slightly longer than the prothorax; eyes elongate in dorsal aspect. Antennae seven segmented, third and fourth segments with the usual forked sense cones. Mouth cone broad and heavy, extending across prosternum; maxillary palpi two segmented. Pronotum subrectangular, wider than long, with two strong bristles at each hind angle. Wings moderately narrow, curved outwards. Legs short and rather stout. Abdomen elongate, sharply conical at apex; ninth segment nearly twice as long as the tenth; tergites bearing a fringe-like series of chitinous

plates on the posterior margin (visible only in distended specimens).

Genotype: *Poethrips furcatus* spec. nov.

The species for which this genus is erected resembles those of the genus *Baliothrips* Haliday in the possession of seven segmented antennae, two segmented maxillary palpi, and two bristles at the hind angles of the prothorax. It differs from *Baliothrips* in the following characters:—fringe of plates on the posterior margin of the abdominal tergites, relatively longer ninth segment of the abdomen, flattened head, elongated eyes, and pedicellate sixth antennal segment. The new genus is related to *Bregmatothrips* Hood but differs from it in the seven segmented antennae and the forked sense cones.

***Poethrips furcatus* spec. nov.** (Pl. I, Figs. 3, 4, 5.)

Female (macropterous). Length about 1.4 mm. Color dark brown and yellow: head dark brown, occiput unevenly yellowish brown for about one-fifth length of head from base; eyes black; antennae: I, VI, and VII brown, II brown but yellowish on dorsum at apex and on outer side, III, IV and V greyish yellow; mouth cone brown. Prothorax light brown; pterothorax brown in sclerotic parts, wing-insertions yellow; wings clear, yellowish, without dark bands; legs: all coxae and femora, and middle and hind tibiae brown, fore tibiae yellow at apex, increasingly browner towards base, all tarsi yellow. Abdomen brown, shaded blackish brown at sides towards apex, segment X blackish brown.

Head longer than wide, its width about 0.9 of its length, its length about 1.2 that of prothorax; cheeks parallel; occiput with about ten anastomosing lines of sculpture between base and postocular setae; vertex not sculptured; head somewhat flattened, slightly raised in front of ocelli and feebly produced in front of eyes; head setae as illustrated. Eyes large, bulging slightly, about half as long as head, their width about 40μ and their interval about 72μ . Ocelli about 8μ in diameter, their position as illustrated.

Antennae about 1.7 as long as head, moderately slender; segment V narrowed at apex, VI constricted at base, VII half as long as VI; sense cones: III with one forked cone on dorsum, the branches slender, IV with a similar cone on ventral aspect, V with two very inconspicuous cones, a rudimentary one on outer side and a slender one on inner side, VI with a long cone on inner side, a short stouter one opposite it on outer side, and a third on ventral aspect near apex.

Mouth cone broad and moderately long, reaching across prosternum; maxillary palpi about $40\ \mu$ long, the distal segment about $28\ \mu$, as illustrated; labial palpi about $12\ \mu$ long and much more slender than the maxillary pair.

Prothorax a little more than 1.3 times as wide as long, pronotum feebly transversely striate, with scattered setae, and two moderately strong bristles at posterior angles, the inner pair about $40\ \mu$ and the outer about $30\ \mu$ in length.

Pterothorax slightly longer than wide, mesothorax distinctly wider than metathorax; wings curved outwards; fore-wings about fifteen times as long as their width near the middle, costa with about 20 bristles and a moderately long fringe; anterior vein with four bristles at base, three at origin of posterior vein, and two near apex; posterior vein with about 8–10 more or less equidistant bristles covering the greater part of its length. Legs moderately short and stout; fore femur length about $136\ \mu$, width $56\ \mu$; tibia length 112, width $40\ \mu$; hind leg: femur 152 by $40\ \mu$, tibia 144 by $40\ \mu$; hind tibia with a row of five short, stout spines on inner side, and three at apex of which the longest is about $30\ \mu$ in length; legs with numerous setae (omitted in the figure).

Abdomen slender, rather sharply conical at apex; bristles on IX and X subequal, about $120\ \mu$ in length; tergites laterally with striae like those on prothorax; segment IX about 1.8 as long as the tenth.

Measurements of holotype (female) in mm.:—Length 1.4; head length 0.173, width 0.153; prothorax length 0.14, width 0.19, posterior-angular spines 0.041 and 0.029; pterothorax length 0.27, width 0.26; fore-wing length 0.78, width at base just beyond scale 0.07, at middle 0.05; abdomen length 0.9, width 0.28.

Antenna, length, 0.3 mm.

segments	I	II	III	IV	V	VI	VII
length in μ	29	37	47	45	41	58	29
width in μ	29	29	21	21	21	21	8

Described from six mounted females taken by the writer in grass sweepings at Conjeni on the White M'folosi river, Zululand, 12.ix.1922.

Perissothrips halli spec. nov. (Pl. I, Figs. 6, 7, 8.)

Female (macropterous). Length about 1.0 mm. Color uniformly pale lemon yellow, only extreme tip of segment X of abdomen shaded brown, segments IV to VI of antennae shaded gray in distal half, with VI distinctly darker than the others, segments VII and VIII gray; pigmentation of eyes very dark red, almost black.

Head very small, about twice as wide as long, and only about 0.3 as long as the prothorax; eyes large, occupying nearly 0.8 of the length of the head, their width 40μ , their interval about 28μ . Posterior ocelli contiguous to eyes; antecellar and inter-ocellar setae minute, pale. Antennae very similar to those of the genotype, except that segment VII bears a long slender sense cone on the outer side; cones on III and IV forked, respectively dorsal and ventral, one on outer side of V very small, VI with one very long cone on inner side and an inconspicuous small one on outer side.

Mouth cone long and slender, attaining anterior margin of mesosternum; maxillary palpi three segmented, basal and distal segments about 24μ in length, second 16μ , a slender seta at apex of third segment about 16μ long; labial palpi about 20μ in length.

Prothorax as long as its width at base, and about 3.5 times as long as the head; a group of three short stout spines (about 20μ long) at each posterior angle, with a more slender and slightly longer bristle beneath them; eight weaker setae on hind margin, and a number of pale setae (not illustrated) scattered over surface of pronotum.

Pterothorax about 1.3 as wide as prothorax, its sides nearly parallel; wings long and slender; anterior vein with 4 bristles near base, then a group of three, and three widely separated bristles beyond middle of wing; posterior vein with 4 widely separated, more or less equidistant bristles. Fore femora enlarged, about 0.6 as wide as long, tibia angular at apex on inner side, with a seta at tip of angle, and a small tooth about 4μ in length below it. Hind femora stout, about 120 by 50μ , tibiae about 120 by 32μ , tarsi 56μ in length; longest spine at apex of hind tibiae on inner side about 16μ .

Abdomen somewhat broader than thorax, sharply pointed at apex; segment IX about 80μ long, its caudal bristles about 64μ , and a pair of lateral ones in front of these about 28μ ; segment X about 68μ long, its bristles about 80μ long and weaker than those on IX; tergites I to IX with transverse anastomosing lines of sculpture.

Measurements of holotype (macropterous female) in mm.:—Length 0.98 (very slightly distended); head length 0.05, width 0.103; prothorax length 0.173, width 0.173; pterothorax length 0.22, width 0.22; fore-wing length 0.58, width at base just beyond scale 0.062, at middle 0.037; abdomen length 0.6, width 0.26. Fore-leg: femur length 0.116, width 0.07; tibia length 0.091, width 0.033; tarsus length 0.058, width 0.021. Antenna length 0.22 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	21	31	33	33	33	39	8	12
width in μ	21	21	17	17	17	12	6	4

Male (macropterous). Length about 0.7 mm. Smaller than female and somewhat darker yellow. Fore femora somewhat more strongly enlarged, fore tibiae each with two recurved teeth about 8μ in length at apex on inner side. Tergites II to VIII of abdomen produced, overlapping the succeeding segments, their caudal margins bearing a row of minute sharply pointed teeth; on II and III the teeth are very small, on IV-VI somewhat more conspicuous, on VII and VIII much larger, reaching a length of about 6μ . (These teeth can be seen to best advantage in specimens cleared in NaOH). In addition, tergites IV to VI have at each hind angle a group of three or four finger-like spines, the longest about 10μ , the outer one or two of each group strongly bent outwards; the figure reproduced is a drawing of what I regard as a more or less typical group of spines, but the groups are variable in number and shape of spines even on the same segment. Transverse striae present on tergites, best developed on segment I, on IX semi-circular and interrupted at short intervals. Setae at apex of abdomen very slender, about 80μ in length.

Measurements of allotype (macropterous male) in mm.:—Length 0.72 mm.; head length 0.058, width 0.103; prothorax length 0.165, width 0.161; pterothorax width 0.202; forewing length 0.54, width at base just beyond scale 0.054, at middle 0.033; abdomen length 0.38, width 0.21. Fore-leg: femur length 0.103, width 0.07; tibia length 0.091, width 0.037; tarsus length 0.045, width 0.021.

Antenna length 0.198 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	17	25	33	29	29	35	8	10
width in μ	21	17	14	17	14	12	4	4

Described from 11 mounted specimens, all macropterous, 6 ♀♀ and 5 ♂♂, taken by Dr. W. J. Hall at Mazoe, Southern Rhodesia, on *Acacia* (probably an indigenous species) on 31.x.1928.

This species is readily distinguished from the genotype *P. parvicaps* Hood by the following characters: (1) relatively longer prothorax, (2) small tooth on fore tibia of female, (2) two larger teeth on fore tibia of male, (4) stronger development of armature on abdominal tergites in the male. I take pleasure in naming this very distinct new species after its collector.

Rhinothrips gen. nov.

Head small, about 0.7 as long as wide, and a little more than half as long as prothorax; antennae broad and heavy,

about three times as long as the head, eight segmented, segments III and IV with forked sense cones. Mouth cone long and heavy, almost twice as long as dorsal length of head, attaining mesosternum; maxillary palpi slightly less than half as long as mouth cone, three segmented, second segment longest; labial palpi two segmented, about one-fourth as long as maxillary palpi, the distal segment five times as long as the basal one. Prothorax about 1.5 as wide as long, broadly rounded behind; three small, inconspicuous spines at each hind angle. Legs short and stout, unarmed except for a pair of stout sharp setae at apex of hind tibiae on inner side. Posterior margin of first abdominal tergite in both sexes with a row of minute irregular tooth-like serrations. Sense-areas on sternites III to VII of abdomen in male minute, sub-circular.

Genotype *Rhinothrips rostratus* spec. nov.

This genus is closely related to *Perissothrips* Hood but differs from it (1) in the relatively shorter prothorax, (2) in the unarmed fore tibiae of the male, and (3) in the absence of teeth on the caudal margins of tergites IV to VIII of the abdomen in the male. From *Rhamphothrips* Karny it differs in the number of the antennal segments, and from *Chilothrips* Hood it can be distinguished by the shape and relative width of the prothorax, which is only slightly widened behind in *Chilothrips*.

Rhinothrips rostratus spec. nov. (Pl. I, Fig. 9.)

Male (dealted). Length about 0.8 mm. Color brown and yellow. Head light yellowish brown, eyes black, ocelli with bright red hypodermal pigmentation; antenna: I and II greyish yellow, I slightly darker, III and IV yellow, uniformly tinged with light brown, V to VIII light brown; mouth cone colored like the head. Prothorax yellow, shaded faintly with brown. Pterothorax light brown, darker than head. All legs yellow, faintly brownish at tips of tarsi. Abdomen: segments I and II brown like pterothorax, III to VIII yellow, paler than prothorax; IX and X yellow with light brown shading.

Head small, about 0.7 as long as wide, slightly widened behind; occiput with about five transverse lines; vertex not depressed; eyes large, about 0.7 as long as the head, very slightly protruding, closely faceted; ocelli close together on a slightly raised hump, the posterior pair contiguous to eyes; inter-ocellar and other setae minute. Antennae inserted below the vertex, about 2.9 times as long as the head; segments II to V short, broad, subequal in length, II widest in whole

antenna; III to VI strongly pedicellate; areola on II on distal margin; sense cone on dorsal side of III forked, the branches extending broadly laterad; the forked cone on ventral side of IV with longer branches extending cephalo-laterad; V with one short cone on outer side; VI with a long cone inserted near the middle on the inner side and reaching to the middle of VII, a small cone near the middle on the outer side, and a moderately long cone on the ventral aspect near the cephalo-lateral angle. Mouth cone as described in diagnosis of genus.

Prothorax not sculptured, about 1.5 as wide as long; scattered small setae on surface of pronotum, three short spines at each posterior angle, and two on each anterior angle, none of these more than 8μ in length. Mesoscutum transversely striate, metascutum longitudinally striate at sides, transversely striate in front; sides of pterothorax obliquely striate.

Legs stout, fore femur about 80μ long by 40μ wide, tibia 64 by 28μ , much narrower at base; hind femur and tibia respectively about 92 by 36μ and 80 by 28μ ; fore femur with two spines on anterior surface that are stronger than the prothoracic spines, hind tibiae with a pair of similar spines on inner side at apex.

Abdomen moderately slender, feebly sculptured with about three transverse irregular lines across tergites I to IX, and several oblique lines at the extreme lateral margins of each tergite; dorsal surface of tergites minutely pitted, this especially noticeable on first and second (*i.e.*, brown) tergites. Tergites II to VIII each with six equidistant weak setae in a transverse row somewhat behind the middle, and a slightly stronger one near the outermost seta close to the posterior angle. Ventro-lateral spines on segment IX about 32μ long; a pair of very short, moderately stout spines near these on the dorsal side; the spines at the tip of the abdomen curved and about 48μ long. Sense-areas on sternites III to VII very small, oval to subcircular in outline, not more than about 10μ in diameter, situated near anterior margin.

Measurements of holotype (déalated male) in mm.:—Length 0.88 (slightly distended); head length 0.058, width 0.083; prothorax length 0.103, width 0.153; pterothorax length 0.18, width 0.18; abdomen length 0.56, width 0.19.

Antenna length 0.173 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	17	25	23	25	23	33	8	14
width in μ	17	21	17	19	17	17	6	4

Female (déalated). Length about 1 mm. Almost identical with male in coloration and structure, except that segment IX of abdomen is not noticeably shaded brown, and segment I of the antennae and the whole of the middle legs

are slightly darker, more distinctly shaded with brown. Ovipositor strong, reaching to apex of segment X. Spines on segment IX and X of abdomen subequal; two dorsal pairs and a lateral pair on IX about $80\ \mu$ in length, the ventral pair much weaker, about $32\ \mu$.

Measurements of allotype (déalated female) in mm.:—Length 0.98 (slightly distended); head length 0.058, width 0.095; prothorax length 0.12, width 0.169; pterothorax length 0.18, width 0.19; abdomen length 0.64, width 0.24.

Antenna length 0.173 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	17	21	25	25	25	37	8	14
width in μ	21	23	19	21	19	17	6	4

Described from 10 mounted specimens, 4 ♀♀ and 6 ♂♂, all idéalated, taken by the writer on *Tephrosia* sp. in the Wood-bush, Pietersburg district, Transvaal, 15.iv.1924.

Dentothrips gen. nov.

Body not depressed, feebly sculptured. Head about as long as wide, produced in front of eyes, eyes large, inter-ocellar bristles about as long as those at posterior angles of prothorax. Antennae eight segmented, segments III and IV with forked sense cones, segment II with a tooth-like projection near apex on inner side. Mouth cone long, heavy, reaching across prosternum, bluntly pointed; maxillary palpi two segmented. Prothorax about 0.8 as long as wide, with two moderately long bristles at each hind angle. Wings long and slender, rather sharply pointed. Legs normal. Abdomen rather broad, sharply conical at apex.

Genotype *Dentothrips graminis* spec. nov.

The projection on the inner side of the second segment of the antennae distinguishes this genus from all known genera; *Projectothrips* Moulton has processes on the dorsal aspect of this segment, but it differs from the new genus in the three segmented maxillary palpi and the very long eighth antennal segment. The projection of the head in front of the eyes, the shape of the wings, the two-segmented maxillary palpi and the forked sense cones suggest *Trichromothrips* Priesner, but this differs in having the mouth cone short and the second antennal segment unarmed. In general appearance the new genus resembles *Bregmatothrips* Hood, but this has three segmented maxillary palpi, unarmed second antennal segments, and simple antennal sense cones.

Dentothrips graminis spec. nov. (Pl. II, Figs. 10, 11, 12.)

Female (macropterous). Length about 1.0 mm. Color yellowish brown: head brownish yellow, shaded to light brown on cheeks; eyes black; ocellar pigment bright red; antennae: I and II yellowish gray-brown, III to VIII pale gray with a faint suggestion of yellow. Mouth cone brown. Thorax similar to head, more brownish, shaded brown on all margins. Fore wings with a median and a distal area shaded gray-brown: basal fifth clear, the median and distal shaded areas each equal to one-third of wing length, and a faintly shaded zone between them about two-thirds as long as basal clear zone; hind wings very pale, greyish, with conspicuous median longitudinal dark line. Legs: all tarsi yellow; tibiae brownish yellow, paler at apices, middle and hind pair shaded brown basally and on outer sides; femora yellow-brown. Abdomen: yellowish brown, tenth segment blackish brown, also the sides of VIII and IX; segments II to VIII demarcated by transverse brown lines, extending completely across abdomen, due to overlapping of caudal margins over anterior margins of succeeding segments, the lines between IV to VIII heavier, about 16μ cephalo-caudad, those between II to IV about 8μ .

Head length equal to its width at base, and about 8μ less than width across eyes; produced part in front of eyes about 20μ long to tip of frontal costa; vertex moderately flattened; cheeks straight; eyes large, length about 64, width 40, interval 48μ ; ocelli situated as on figure; interocellar bristles about 45μ long, other head setae much shorter, arranged as illustrated.

Antennae very similar to those of *Taeniothrips* except for shape of segment II; the tooth-like projection on II about 4μ long, somewhat variable in shape and direction of the tip, as illustrated; forked sense cones of III and IV respectively dorsal and ventral, or normal shape, IV with an additional simple cone on outer side near apex; V with a small cone on inner and a larger one on outer side; VI with three cones: inner one long, outer short, ventro-apical one intermediate in length.

Mouth cone bluntly pointed, extending across prosternum; maxillary palpi: basal segment about 8, distal 28μ long; labial palpi about 20μ , much more slender.

Prothorax wider than long, widened posteriorly, surface not sculptured, setae as illustrated, two pairs at hind angles about 45μ in length. Mesothorax wider than metathorax, sides rounded, mesoscutum feebly transversely striate; sides of metathorax parallel, metascutum with more distinct, anastomosing striae and 4 setae on anterior margin subequal

to anterior marginals of prothorax. Fore wings narrow, about 20 times as long as their width at middle; costal bristles long, subequal to fringe hairs near anterior apical margin; fore-vein with bristles as follows: 3 at base, 3 at origin of posterior vein, 2 at apex; hind vein with 7 to 8 more or less regularly spaced bristles.

Fore femora slightly enlarged, about 100μ by 44μ wide, tibiae about 100 by 36μ ; hind femora 120 by 40 , tibiae 144 by 32μ ; fore tibiae with a minute pointed spur on inner side at apex.

Segment IX of abdomen 80μ long, its bristles about 120μ ; segment X divided above throughout its length, its length about 68μ , its bristles 90μ .

Measurements of holotype (female) in mm.:—Length 1.0; head length 0.112, width across eyes 0.12, at base 0.112; prothorax length 0.14, width 0.17, postero-angular spines 0.045; pterothorax length 0.194, mesothorax width 0.2, metathorax width 0.18; fore-wing length 0.6, width at base just beyond scale 0.058, at middle, 0.037; abdomen length 0.62, width 0.25.

Antenna length 0.24 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	21	25	37	33	33	41	10	12
width in μ	29	27	17	17	17	19	8	4

Described from 4 macropterous, mounted females, taken by the writer on grass at Pretoria, 2.xii.1923. This species is readily distinguished from all known forms by the peculiar shape of the second antennal segment.

Caprithrips gen. nov.

Body moderately elongate and depressed. Head about 0.8 as long as wide, widest across eyes, produced in front of eyes, produced part about one-sixth of total length of head; eyes large, strongly protruding. Mouth cone heavy, broadly rounded, reaching half way across prosternum, maxillary palpi three segmented. Antennae twice as long as head, segments III to V short, almost as wide as long; sense cones on III and IV simple, not forked.

Prothorax about 1.3 as wide as long, about 1.6 as wide behind as in front, and about 1.4 as long as the head; pronotum without any long spines. Legs short and stout. Abdomen elongate, broadly conical at tip, not sharply narrowed at base of segment IX or X but evenly narrowed from base of VII to apex of X; tergite IX with two stout bristles on dorsum, about half as long and twice as thick as longest bristles on same tergite.

Genotype *Caprithrips analis* spec. nov.

This genus resembles *Anaphothrips* Uzel and *Agerothrips* Trybom but differs from them in the simple sense cones of the antennae. From *Bregmatothrips* Hood it differs in lacking well developed pronotal spines. The broadly conical tip of the abdomen and the enlarged bristles on tergite IX are distinctive characters.

Caprithrips analis spec. nov. (Pl. II, Figs. 13, 14.)

Female (apterous). Length about 1 mm. Color pale yellow, eyes so dark red as to appear black; antennae: segments VI to VIII light brown, V greyish yellow, I to IV yellow; distal half of segment X of abdomen shaded light brown; mouth cone brown at tip.

Length of head equal to its width behind eyes, width across eyes about 0.012 mm. wider; cheeks parallel; vertex produced in front of eyes into a rounded hump that covers about half of the first antennal segments. Eyes large, closely faceted, about 0.6 as long as the head, their width about 32μ and their interval 44μ . Ocelli absent. Head setae as illustrated. Occiput with about 10 transverse striae. Antennae as illustrated; segments III and IV each with one simple sense cone on outer side, the cone on III dorsal, the one on IV ventral in position; V with a very slender cone on outer side; VI with a long cone on inner side and two shorter cones on outer side. Maxillary palpi about 28μ long, first and third segments subequal in length, second shorter, first about twice as broad as third. Labial palpi slightly longer than third segment of maxillary palpi.

Prothorax wider than long, more than one and a half times as wide behind as in front; surface of pronotum with numerous fine transverse striae and scattered setae; setae on hind margin and angles very weak, not more than 12μ in length. Meso- and metanotum rectangular, minutely striate like the pronotum, devoid of large bristles. Legs short and stout, fore femora slightly more enlarged than others, hind tibiae strongly expanded especially in distal third, other tibiae also broad.

Abdomen rather elongate, segments III to VII subequal in width and length, their length about one-third of their width. Tip of abdomen stout, broadly conical. Tergites faintly and minutely transversely striate; tergites I to VIII each with a transverse row of eight weak setae on hind margin, subequal in length on all segments; tergite IX bears near the caudal margin three pairs of long slender bristles about 100μ in length, and a dorsal pair (about 48μ apart)

of distinctly stronger bristles about twice as thick and half as long as the three pairs near the caudal margin. Tergite X bears two pairs of dorsal bristles about 80μ in length.

Abdominal sternites II to V each with about 12–15 minute teeth on hind margin at sides; on sternites II to VII there are two transverse rows of about eight setae increasing in length caudad.

Measurements of holotype (female) in mm.:—Length 0.97 (slightly distended); head length 0.088, width across eyes 0.1, behind eyes 0.088; prothorax length 0.124, width at base 0.16, at apex 0.1; postero-angular setae on pronotum 0.012; pterothorax length 0.16, width 0.168; abdomen length 0.67, width 0.208. Fore leg: femur length 0.08, width 0.044, tibia length 0.06, width 0.036; hind femur length 0.096, width 0.04, tibia length 0.092, width 0.032.

Antenna of *paratype* female, length 0.176 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	20	24	24	24	24	40	8	12
width in μ	24	24	18	20	16	16	8	4

Described from two apterous females taken by the writer from the base of tufts of tall grass at Pretoria, 4.ii.1931. This interesting new species can readily be distinguished by the generic characters.

***Neothrips obesus* spec. nov.** (Pl. II, Figs. 15, 16.)

Male (brachypterous). Length about 1.1 mm. Color of body and appendages rather uniformly light brown, tinged with yellow; only segment II of antennae, and tarsi, somewhat paler, brownish yellow. All spines pale, inconspicuous.

Head about 1.1 as long as wide, and very slightly shorter than the strongly chitinized part of pronotum. Cheeks parallel. Postoculars stout, expanded apically, about 28μ in length, situated about half their length from posterior margin of eyes. Eyes greatly reduced, consisting of about four facets, scarcely protruding; about six minute setae on dorsal aspect of head, and four in a transverse row between eyes near anterior margin. Ocelli absent. Dorsal surface of head in posterior half with transverse striations that anastomose sufficiently to produce an effect of weak reticulation.

Antennae inserted beneath the vertex, the outer basal angles of their first segments appearing to extend beneath the median margin of the eyes. Antennae about twice as long as the head, rather broad and heavy; segments VII and VIII closely united, but the suture between them distinct; sense cones: III, 0–1; IV, 1–1; V, 1–1; VI, 1–1; VII one on dorsum.

Mouth cone long, slender and sharply pointed, extending well on to mesosternum; maxillary palpi about 28μ in length, the second segment about six times as long as the first; labial palpi about 30μ in length, the two segments subequal. Labrum sharply pointed.

Prothorax large, and elongate in appearance, anterior stippled membrane strongly developed, about 0.05 mm. in length, and bearing the two anterior angular spines; width of prothorax (including coxae) about 1.9 times the length of the sclerotic part of the pronotum. All the usual spines present, pale, inconspicuous, expanded at apex, subequal in length to postoculars.

Pterothorax rectangular, slightly narrower than prothorax; rudimentary wings minute. Fore femora enlarged, width equal to half their length; fore tibiae short, fore tarsus with a short tooth (about 8μ in length), blunt on both tarsi of holotype, sharply pointed on one fore tarsus of male paratype. Middle and hind legs short and robust; hind femora nearly half as wide as long, and about 0.9 as long as fore femora.

Abdomen broad and heavy, wider than prothorax across coxae. Dorsal spines on segments II to VI broadly expanded at apex like those on prothorax: posterior angulars subequal to postoculars, marginals slightly longer. Posterior angular spines on segment IX long and pointed, nearly as long as tube, those on VII also pointed but somewhat shorter; marginal pair on VII and two pairs on VIII expanded apically and nearly twice as long as postoculars; IX also bears two pairs of capitate bristles distinctly less widely expanded than postoculars, the inner pair two-thirds as long as tube and much longer than the outer pair. Setae at tip of tube weak, about three-fourths as long as tube. Segments II to IX bear a transverse row of 6 to 10 minute setae on dorsum near the middle of each tergite; on the ventral aspect of segments II to VIII there is a similar row of minute setae across the middle, and two longer, pointed setae on the posterior margin.

Tube short and heavy, about 0.8 as long as head, more than twice as wide at base as at apex, sides slightly concave near the middle.

Measurements of holotype (male) in mm.:—Length 1.16 (distended). Head length 0.124, width 0.112; mouth cone length 0.145; prothorax length 0.128, (anterior membrane 0.054) width 0.248; spines: posterior angulars 0.033, on coxae 0.025; pterothorax length 0.165, width 0.232; abdomen length 0.76, width 0.28; tube length 0.095, tube setae 0.07, tube width at base 0.066, at apex 0.029; spines on ninth abdominal

segment: knobbed 0.058, pointed 0.091, on eighth 0.05. Fore-leg: femur length 0.132, width 0.066, tibia length 0.07, width 0.037; tarsus length 0.041, width 0.029.

Antenna length 0.25 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	25	33	33	33	33	37	37	17
width in μ	29	29	25	27	25	23	19	12

Female (brachypterous). Practically identical with male in coloration, form and details of structure, with the following exceptions: abdomen somewhat broader; teeth on fore tarsi smaller; two pairs of capitate bristles on dorsal aspect of ninth abdominal segment more widely expanded (though not quite as broad as those on eighth), and both pairs about two-thirds as long as tube.

Measurements of allotype (female) in mm.:—Length 1.2 (slightly distended). Head length 0.12, width 0.132; prothorax length 0.132 (anterior membrane 0.045), width 0.24; spines: posterior angulars 0.033, on coxae 0.029; pterothorax length 0.145, width 0.25; abdomen length 0.8, width 0.32, tube length 0.107, tube setae 0.066, tube width at base 0.074, at apex 0.029; spines on ninth abdominal segment 0.066, on eighth 0.05. Fore-leg: femur length 0.116, width 0.058, tibia length 0.07, width 0.037; tarsus length 0.041, width 0.029, tooth 0.008.

Antenna length 0.27 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	29	37	37	37	33	37	41	21
width in μ	29	33	29	29	27	25	21	14

Described from five mounted specimens: two ♂♂ and three ♀♀ taken by the writer under the bark of a "fever" tree (tall, yellow-barked *Acacia* sp.) on the Ubombo mountain in Zululand, 17-ix-1922.

This species differs from *N. corticis* Hood in the relatively shorter head, the absence of long pointed spines on segments VI and VIII of the abdomen, the pale coloration of segment II of the antennae, and the smaller tarsal teeth of the male.

(Continued in April number)

EXPLANATION OF PLATES

(J. C. F. del)

PLATE I

Heliothrips sylvanus spec. nov.

Fig. 1—♀ paratype, head and prothorax

Fig. 2—♀ holotype, left antenna

Poethrips furcatus gen. et spec. nov.

Fig. 3—♀ holotype, head and prothorax

Fig. 4—♀ paratype, maxillary palpus

Fig. 5—♀ holotype, right antenna

Perissothrips halli spec. nov.

Fig. 6—♂ allotype, head and prothorax

Fig. 7—♂ allotype, right antenna

Fig. 8—♂ paratype, right posterior angle of fourth tergite

Rhinothrips rostratus gen. et spec. nov.

Fig. 9—♂ holotype, head and prothorax

PLATE II

Dentothrips graminis gen. et spec. nov.

Fig. 10—♀ holotype, head and prothorax

Fig. 11—♀ holotype, second segment of left antenna

Fig. 12—♀ holotype, right antenna

Caprithrips analis gen. et spec. nov.

Fig. 13—♀ paratype, left antenna

Fig. 14—♀ holotype, head and prothorax

Neothrips obesus spec. nov.

Fig. 15—♂ holotype, head and prothorax

Fig. 16—♂ holotype, right antenna

Pseudocryptothrips proximus spec. nov.

Fig. 17—♂ holotype, head and prothorax

Fig. 18—♂ holotype, left antenna

PLATE III

Allothrips africanus spec. nov.

Fig. 19—♀ holotype, head and prothorax

Fig. 20—♀ holotype, right antenna

Idiothrips bellus gen. et spec. nov.

Fig. 21—♀ holotype, head and prothorax

Fig. 22—♀ holotype, right antenna

Fulgorothrips priesneri gen. et spec. nov.

Fig. 23—♂ paratype, head and prothorax

Fig. 24—♂ paratype, right antenna

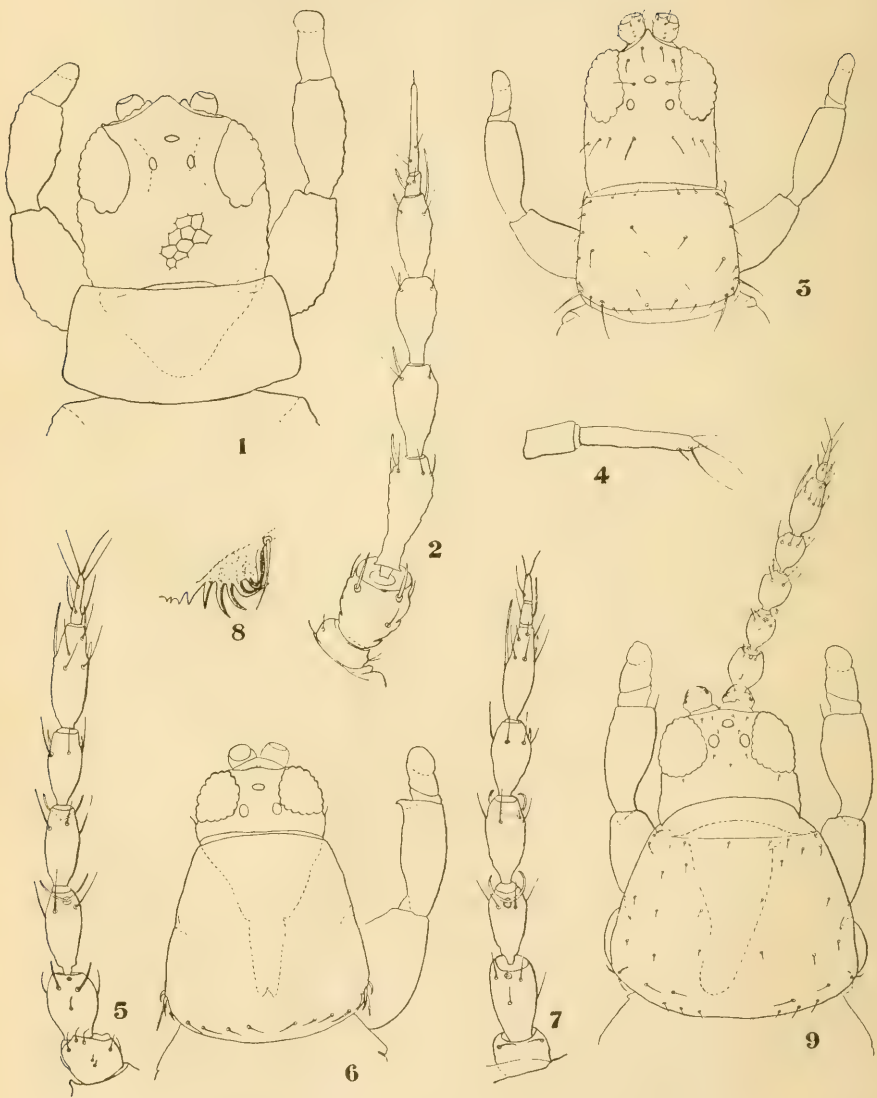
Hoodiana pallida gen. et spec. nov.

Fig. 25—♀ holotype, head and prothorax

Fig. 26—♀ holotype, left antenna

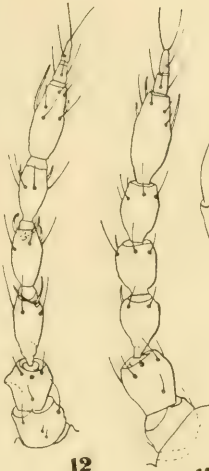
Stephanothrips graminis spec. nov.

Fig. 27—♀ paratype, head and prothorax





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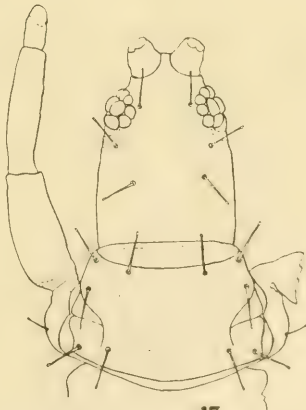
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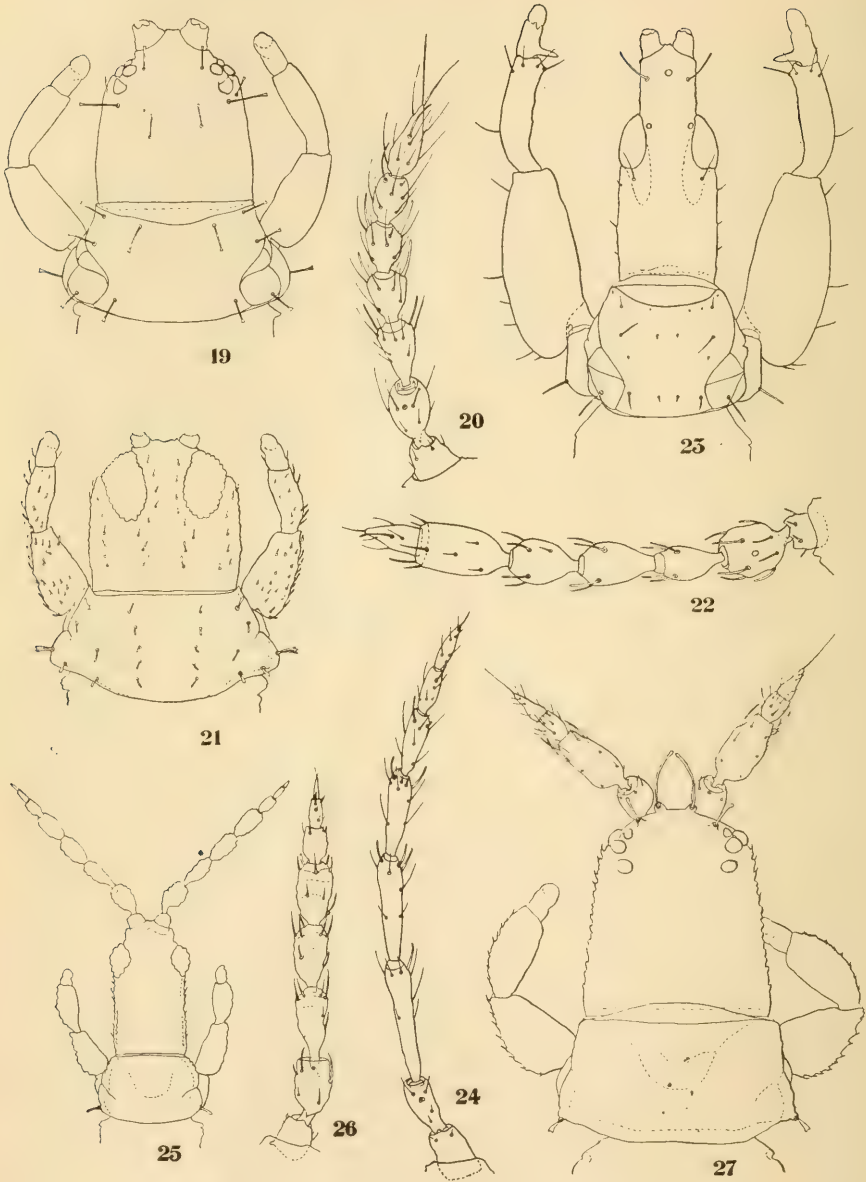
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STUDIES ON HYDROPORUS

BY MELVILLE H. HATCH, Seattle, Washington.

Fall (Bull. Brooklyn Ent. Soc. XXVII, 1932, p. 145) points out the close affinity of *Hydroporus brodei* Gellermann and *H. quadrimaculatus* Horn. We were misled in the placing of *brodei* by the inaccuracies of Fall's treatment of *quadrimaculatus* (Rev. N. A. species *Hydroporus* and *Agaporus*, 1923, p. 112, 117). If that author had examined the metacoxae of *quadrimaculatus*,—which he writes me he had not done,—the impropriety of placing the species in a group with the "mesial line between the posterior coxal processes more or less abbreviated behind" would at once have become apparent. The mesial line is really acutely triangularly produced, its apex surpassing the level of the lateral metacoxal process. I am convinced, however, that rather than erect a new group for it it is better to expand Zimmermann's (Arch. Naturg. 83, A, 1917 (1919), p. 183-184, fig. 17) subgenus *Deronectes* s. str. This is a group hitherto unknown from America. The old world species of *Deronectes* s. str., however, have the mesial line of the metacoxae prominent but not surpassing the level of the lateral metacoxal processes. The characters of the subgenera of *Hydroporus* (sensu Fall) are set forth in the following key.

KEY TO THE SUBGENERA OF HYDROPORUS (SENSU FALL)

- A¹. Lateral process of metacoxae narrower than the common median portion that may or may not be lobed
 - B¹. Apex of metacoxae truncate or nearly so; Holarctic
subg. *Hydroporus* (s. str.)
 - B². Median metacoxal line prominent; Nearctic
subg. *Heterosternus* Zimm.
- A². Lateral processes of metacoxae wider than the common median lobe which may be entirely obsolete
 - B¹. Scutellum invisible
 - C¹. Median metacoxal line prominent
 - D¹. Apex of prosternum narrow, more or less carinate; Palaearctic, Nearctic (Pacific Coast)
subg. *Deronectes* Sharp
 - D². Apex of prosternum broad, not carinate;
Europe subg. *Stictotarsus* Zimm.
 - C². Median metacoxal line abbreviated
 - D¹. Venter opaque, densely micropunctulate; pronotum without longitudinal foveae at sides;

- metafemora densely punctate at least in part;
Holarctic, Ethiopian, Oriental, Central
America (*Potamodytes* Zimm., *Deronectes*
Fall) subg. *Potamonectes* Zimm.
- D². Venter shining, not densely micropunctulate;
metafemora with only a few seta-bearing
punctures
- E¹. Length 2.5–5 mm., the smaller species
broadly oval or subrotundate; pronotum
usually longitudinally foveate at sides,
vaguely transversely impressed towards
base; Holarctic ..subg. *Oreodytes* Seidl.
- E². Length 2–3.5 mm., usually under 3 mm.,
elongate oval; pronotum with or
without longitudinal foveae at sides,
base not transversely impressed;
Palearctic
- F¹. Upper surface microreticulate; form
narrower ..subg. *Graptodytes* Seidl.
- F². Upper surface punctulate; form
broader ..subg. *Stictonotus* Zimm.
- B². Scutellum visible at apex; Ethiopian
sub. *Nebrioporus* Reg.

Hydroporus (*Potamonectes*) *mathiasi* sp. nov.

Elongate oval; above straw colored; head black with testaceous anterior margin forming an angle between eyes and testaceous transverse frontal spot; pronotum with black or rufous apical and basal markings which fuse more or less broadly on disc with exception of a longitudinal straw colored median spot; elytra with six more or less interrupted and semiconfluent rufous vittae on a straw colored background, with two feebly impressed discal series of punctures; margin without subapical tooth. Dorsum finely densely punctate, virtually glabrous, microreticulate. Venter black, densely micropunctulate, the legs and mouthparts and epipleurae pale. Mesocoxae very narrowly separated.

Type and seven paratypes: Austin Pass Lake, Mt. Baker, Washington, VIII–13–1932. T. Kincaid (in collection of author). Nine paratypes variously from Queets Basin, Olympic Mts., F. W. Mathias; Paradise Park (Robert Flock) and Tipsoo Lake (M. C. Lane), Mt. Rainier, the latter in Mr. Lane's collection.

The glabrous dorsum and faded out dorsal markings distinguish this species from *griscostratus* DeG. and related species in Fall's key (*l.c.*, p. 100). The elytral punctures may possibly be set with extremely short and minute setae.

I name this species in honor of Mr. F. W. Mathias of Hoquiam, Washington, who presented me with my first specimen of the species in 1928. It is an interesting Alpine type, apparently confined to small mountain lakes at an elevation of about 5000 feet.

The subgenus *Oreodytes* Seidl.

Twenty-two of the twenty-three species of the subgenus *Oreodytes* are set forth in the following key. Of these I have seen specimens of all but six: *bisulcatus* Fall, *picturatus* Horn, *laevis* Kby., *recticollis* Fall, and *alaskanus* Fall. *Dauricus* Mots. from Siberia is omitted. For literature see Seidlitz, Verh. Nat. Ver. Brünn XXV, 1886, p. 57-59; Zimmermann *l.c.*, p. 190-192; Fall *l.c.*, p. 112-121 and Pan-P. Ent. II, 1926, p. 138-141; Hatch, Bull. Brook. Ent. Soc. XXIII, 1928, p. 220-222.

The members of this subgenus are primarily inhabitants of running water or live in pools and eddies immediately adjacent thereto. The group is particularly developed along the Pacific coast of North America where fifteen of the twenty-three known species occur.

KEY TO SPECIES OF OREODYTES SEIDL.

- 1 Epipleura impressed at base for reception of apex of meso-femur
- 2 Form elongate oval
- 3 Pronotum narrower than elytra at base; elytra nearly glabrous
- 4 Epipleura black or slightly paler towards its outer anterior angle; length 3.4-4 mm.; dark band along inner margin of eye usually more distinct.
- 5 Discal series of punctures moderately impressed; elytra nigro-lineate or with the markings more or less fused; scattered punctures of elytra coarse and evident or nearly obsolete; B. C. and Newfoundland to N. H., N. Y., n. Mich., Idaho, and Wash. (*septentrionalis* Fall nec Gyll.) ... *scitulus* Lec.
- 5' Discal series of punctures more strongly impressed; Cal. *bisulcatus* Fall.
- 4' Epipleura pale; dark band along inner margin of eye feeble or broken; elytra nigrolineate or (ab. *devillei* Rég.) nearly uniform black; length 2.6-3.3 mm.; central and northern Europe, Siberia *septentrionalis* Gyll.
- 3' Pronotum as wide as elytra, not foveate at sides; elytra evidently pubescent; length 4-4.5 mm.; central Europe, Mediterranean *halensis* F. and varieties.
- 2' Form broadly oval
- 6 Elytra without sutural series of punctures

- 7 Elytra nigrolineate, the markings frequently more or less fused
- 8 Sides of metacoxae coarsely punctate; scattered punctures of elytra evident; disc of pronotum with a single transverse fascia or with the entire disc more or less obscurely piceous; length 3-3.15 mm.; Mont., Utah, Wash.
crassulus Fall.
- 8' Sides of metacoxae finely punctate
- 9 Elytra with scattered punctures
- 10 Disc of pronotum with at most a single transverse fascia; scattered punctures of elytra very small and obscure
- 11 Scattered punctures of elytra larger and sparser, confined to the vicinity of the suture; the two impressed elytral series of punctures evident; length 2.7-2.95 mm.; width 1.6-1.85 mm.; Cal. to B. C. *obesus* Lec.
- 11' Scattered punctures of elytra very small, almost invisible, and evenly distributed; impressed series of dorsal punctures nearly obsolete; forms with the markings expanded or reduced constitute the ab. *rivalis* Gyll. and ab. *alienus* Sharp respectively; length 3 mm., width 1.8 mm.; central and northern Europe, Siberia *sanmarki* Sahlb.
- 10' Disc of pronotum with two transverse fasciae; scattered punctures of elytra more evident; length 2.8 mm., width 1.15 mm.; Wash. *angustior* Hatch.
- 9' Elytra without scattered punctures; the two impressed series of elytral punctures evident; length 2.6-2.85 mm., width 1.5-1.75 mm.; N. M. and Ariz. to Mont., Alta., B. C., and Wash. *congruus* Lec.
- 7' Elytra not nigrolineate
- 12 Above and below more numerous and coarsely punctate; pronotum narrower at base than elytra; posternal and metasternal process broader; length 3-3.3 mm.; Cal., Wash.
abbreviatus Fall.
- 12' Above and below more sparsely and finely punctate; pronotum as broad as elytra at base; prosternal and metasternal process narrower; length 2.85-3 mm.; Nev., Cal.
picturatus Horn.
- 6' Elytra with impressed sutural series of punctures, not nigrolineate, without scattered punctures; length 3.3 mm.; Cal., Wash. *subrotundus* Fall.
- 1' Epipleura not impressed at base for reception of mesofemur; form elongate oval
- 13 Elytral apex not dentate in either sex
- 14 Pronotum narrower at base than elytra; epipleura black; elytra at apex pale or (ab. *montanus* Zimm.) black; length 4-4.5 mm.; central and northern Europe ... *borealis* Gyll.
- 14' Pronotum as wide at base as elytra; epipleura pale; elytra

very obscurely vitto-maculate; length 3.8 mm.; Wash.

snoqualmie sp. nov.

- 13' Elytral apex externally dentate in female
- 15 Last ventral segment of female without a broad deflexed apical process
- 16 Elytra evidently punctate; epipleura pale; pronotum broader at base than at middle, the sides evenly arcuate; female elytral dentation subrectangular to spinose
- 17 Length 4.5 mm.; narrower; n. Europe *alpinus* Payk.
- 17' Length 5.5 mm.; broader; B. C., Wash. ... *hortense* sp. nov.
- 16' Elytra very obscurely punctate
- 18 Epipleura pale; black markings of dorsal surface more restricted; pronotum pale with a more or less interrupted transverse basal fascia
- 19 Protarsal claws similar in sexes; sides of pronotum nearly straight; length 3.8-4.35 mm.; Lake Superior, Hudson Bay Terr. (*duodecimlineatus* Lec.) *laevis* Kby.
- 19' Male protarsal claws thicker; female elytral tooth somewhat obtuse; sides of pronotum variable; length 4.4-5 mm.; Calif., Y. T. (*yukonensis* Fall, *recticollis* Hatch nec Fall) *semiclarus* Fall.
- 18' Epipleura black; black markings of dorsal surface heavier, the pronotum diffusely clouded with the margins and a central median line pale; sides of pronotum straight and parallel in at least basal half; female elytral tooth nearly rectangular; length 4.8-5.2 mm; Alaska .. *recticollis* Fall¹
- 15' Last ventral segment of female with a broad deflexed apical process; female elytral tooth obtuse
- 20 Epipleura pale; dorsum finely sparsely punctate; female abdominal process broadly truncate; male protarsi somewhat broader than in female; sides of pronotum nearly parallel behind middle; length 4.5-5.3 mm.; Alaska *alaskanus* Fall.
- 20' Epipleura black; dorsum evidently moderately closely punctate; female abdominal process bilobed and more or less notched at apex; male protarsi not broader than in female; shape of thoracic side margin and elytral apex variable; length 4.75-5.5 mm.; Wash. (*kincaidi* Hatch) *rainieri* Hatch.

¹Apparently close to *recticollis* Fall is *dauricus* Mots. from Siberia. It approaches it in having the female elytra dentate, the epipleura black, the elytra finely punctate, the elytral vittae with a tendency to confluence. It is apparently distinguished by its three strongly impressed series of dorsal punctures. The other species with the female elytra dentate have the series of dorsal punctures nearly or quite unimpressed and very inconspicuous. See Motschulsky, L'Abeille XVI, 1878, p. 61; Zimmermann, Arch. Naturg. 83 A, 1917 (1919), p. 190.

H. scitulus Lec.—I have followed Zimmermann in separating this species from *septentrionalis* Gyll., but Fall may really be justified in his contention that, in the last analysis, the two are inseparable. I have seen no American specimen, however, in which the epipleura are as nearly entirely pale as in those from Europe.

There is certainly some evidence of the splitting up of this species into local races in Washington. A series recently taken on the Naches River in eastern Washington is uniformly less evidently punctate with some specimens exhibiting a pale area on the epipleura and the partial disintegration of the dark band along the inner margin of the eye, in all these respects approaching typical *septentrionalis* and differing from the form found in western Washington and along the Columbia River at Plymouth. The specimens Fall (*l.c.*, p. 115) cites from British Columbia and Idaho may belong to this Naches River race.

H. snoqualmie sp. nov.

Oblong oval, the outline feebly notched at base of pronotum and at eyes. Above virtually glabrous, finely microreticulate, the head and pronotum finely and densely, the elytra more coarsely and more sparsely punctate, the pronotum with larger punctures toward the base and apex. Head pale with an oblique dark band on either side of the front which bands fuse with a median dark spot towards the base of the head. Pronotum as wide as elytra at base, with a distinct short longitudinal fold on either side, broadest at base, the side margins arcuate, narrowed from or from slightly before base, with sides and a median spot pale, the disc more or less extensively dark; the dark areas may or may not attain the apical and basal margins. Elytra with two more or less feebly impressed discal series of punctures, pale, marked with about six entire discal and one or two interrupted marginal pale brown or brownish black vittae; apex not or very feebly sexually dimorphic. Epipleura of elytra pale, the basal portion not excavated for reception of the meso-femora. Below pale brownish, the thoracic plates and the metacoxae somewhat darker. Length 3.8 mm.

Type: North Bend (Maloney's Grove), Wash., May 10, 1930, M. H. Hatch (in collection of author). 69 paratypes from North Bend (Maloney's Grove), Green River Gorge (King Co.), Mt. Rainier (Green Water River), and Austin Pass Lake, Mt. Baker, all in western Washington.

H. hortense sp. nov.

Oblong oval. Above glabrous, microreticulate; the head and pronotum finely, the elytra evidently punctate. Head pale with an oblique dark band on either side of the front which fuse with a median dark spot towards base. Pronotum narrower at base than elytra, with a distinct short longitudinal fold on either side, broadest at base, the side margins feebly arcuate. Pronotum pale with a more or less interrupted black basal fascia, the apical and basal margins sometimes black. Elytra pale with six entire black discal and one or two interrupted lateral vittae, the apex very feebly obliquely sinuate (♂) or strongly and subrectangularly to spinosely dentate, the margin sinuate on both sides of the tooth (♀). Epipleura pale, not excavated at base for reception of mesofemora. Below black, the appendages pale except for the basal portions of the femora, which are dark. Terminal abdominal segment not modified in female.

Type ♀, allotype ♂, and 13 paratypes: North Bend (Maloney's Grove), Wash. July 14, 1930, M. H. Hatch (in collection of author). 13 paratypes same data as type taken on May 10 and June 29, 1930. One paratype: Barkerville, B. C. IX-9-1929, Hortense Griffin.

I take great pleasure in naming this beautiful little species for Mrs. Hortense Griffin Lanphere, a student at the University of Washington, who has contributed numerous specimens of Coleoptera to my cabinet and who presented me with my first specimen of this species in 1929.

H. semiclarius Fall (*yukonensis* Fall, *recticollis* Hatch nec Fall).

My short series of specimens from Yukon Crossing is so variable that I am compelled to adopt Fall's original surmise that *semiclarius* and *yukonensis* are identical. My series range in size from 4.4 to 4.75 mm. and the side margin of the pronotum varies from practically straight to such a strongly arcuate condition that I was led to identify some of the specimens erroneously with *recticollis*.

H. rainieri Hatch (*kincaidi* Hatch).

A series of seventy-five specimens, nearly all from the type locality, shows that *kincaidi* is an untenable species. The characters on which it was founded (the divergent posterior pronotal angles, the feebler development of the character of the elytral apex, and the absence of notching of the female abdominal process) occur in every degree of development and in every possible combination.

ON FLORIDIAN HETEROPTERA, WITH NEW STATE RECORDS FROM THE KEYS.

BY J. R. DE LA TORRE-BUENO, White Plains, N. Y.

I.

In November, 1931, Mr. Carl Geo. Siepmann collected a number of Heteroptera at Matecumbe and other near-by places, on the Florida Keys. Homestead is near Royal Palm Park; and Jupiter on the East coast, north of Palm Beach. Isla Morada and Matecumbe are on Upper Matecumbe Key. The species secured and here listed are all, apparently, new records for Florida. All species here cited have been named or checked by Blatchley's keys; and represent, so far as possible, the same species he enumerates and his understanding of them. It follows that in any changes of identification or synonymy in Blatchley, the species in this list will be readily referred where they should belong.

There are 35 species in this lot, some of great interest. Of these, 11 species are wide-spread throughout the Eastern United States, namely: *Homoemus bijugis* Say, *Corimelaena pulicaria* Say, *Pangaeus bilineatus* Say, *Solubea pugnax* Fabr., *Euthochtha galeator* Say, *Chariesterus antennator* Fabr., *Harmostes reflexulus* Say, *Corizus hyalinus* Fabr., *Aradus similis* Bergr., *Oncopeltus fasciatus* Dallas, *Nysius californicus* Stål, and *Phymata fasciata* Gray. The four forms following are recorded from Florida only: *Loxa florida* Van Duzee, *Ischnodemus rufipes* Van Duzee, *Euryophthalmus davisii* Barber, and *Acanthochila exquisita* Uhler. The strictly Neotropical species, found also in the West Indies and the parts of the Americas about the Gulf of Mexico are 12, namely: *Thyanta perditor* Fabr., *Murgantia violascens* Westw., *Arvelius albopunctatus* DeG., *Piezodorus guildinii* Westw., *Podisus sagitta* Fabr., *Chondrocera laticornis* LaP., *Hyalymenus longispinus* Stål, *Harmostes affinis* Dallas, *Oncopeltus sexmaculatus* Stål, *Aphanus illuminatus* Dist, *Dysdercus suturellus* H. S., *Teleonemia belfragei* Stål. The remaining eight species are either peculiar to the Southern seaboard States or else wide-spread in the West and South; these are: *Camirus porosus* Germar known from Vancouver, B. C., south; *Diolcus chrysorrhoeus* Fabr., Southern States; *Euschistus bifibulus* P. B., a widely distributed southern species; *Euschistus servus* reported as from Massachusetts south into Mexico; *Nysius strigosus* Uhler, California south; *Orthoca* (*Paromius*) *longulus* Dallas, Southern

States down into South America; *Zelus bilobus* Say and *Apionomerus spissipes* Say, common southern species.

Barber brings out in his Hemiptera of Florida (which reports all records up to 1914 for both Heteroptera and Homoptera) that 38% of those he records are restricted to Florida and the U. S. in general, about 43% are species of South American origins; about 12% strictly Floridian, and 6% West Indian and Floridian. In Mr. Siepmann's captures we have about 11% Floridian, 30% wide-spread North American species and an equal proportion of Neotropical forms (including West Indian); and finally about 22% of wide-spread southern and western forms. These proportions are quite in keeping, although in slightly different form. The strictly and solely Floridian species seem to be about twice as numerous on the Keys as in the rest of the State, however, according to this lot.

The species of chief interest is the single specimen of *Acanthochila exquisita* Uhler. This seems to be its first record since it was described from four specimens from Cape Florida. Other species worthy of note are: the rare Floridian *Loxa florida* V. D., which takes the place of the West Indian *L. flavicollis*; *Murgantia violascens* Westw., a West Indian species known only from the Keys; *Chondrocera laticornis* LaP.; *Euryophthalmus davisii* Barber, described from Big Pine Key, this being another new record for the species; the seldom seen *Aphanus illuminatus* Distant, a Central American species; the Floridian *Ischnodemus rufipes* Van Duzee; and finally *Nysius strigosus* Uhler, heretofore recorded from Miami.

While the number of species is small, as shown it has a large proportion of interesting records; it also shows the relative proportion of species at a fixed time. A long series of *Chariesterus antennator* Fabr. indicates but little inequality in the ratio of the sexes.

II.

The list of the species taken which follows is arranged according to Blatchley's linear order. A few ecological notes are added to each species.

Corimelaena pulicaria Germar—One specimen only from Key Largo, November; a species that would appear to have been recorded only from Dunedin by Blatchley.

Diolcus chrysorrhoeus Fabr.—Two only from Matecumbe, Nov. 21; a species widespread in Florida and recorded from South Carolina to Texas.

- Homaemus bijugis* Uhler—A long series of this variable species from Matecumbe, Windly, Key Largo and Jupiter; known from Quebec west and south into Mexico.
- Camirus porosus* Germar—One from Matecumbe, November; the species seems to be known from Vancouver and California to Florida, Texas and South America.
- Pangaeus bilineatus* Say—One from Matecumbe; distributed from Quebec to Mexico and widespread in Florida.
- Thyanta perditor* Fabr.—Three from Windly; nine from Key Largo; a common neotropical species.
- Solubea pugnax* Fabr.—Three from Matecumbe and one from Isla Morada; a common form on sedges throughout the Eastern United States.
- Euschistus servus* Say—A common and widespread species from Massachusetts to Louisiana, Texas and Mexico and common everywhere in Florida; represented by only one specimen from Homestead.
- Euschistus bifibulus* P. B.—Twenty-four specimens of this widely distributed and common species from Metacumbe.
- Loxa florida* Van Duzee—Two from Lower Matecumbe; this has been heretofore recorded from Florida by Van Duzee, who described it thence, and by Blatchley.
- Murgantia violascens* Westwood—Three specimens from Windly of this West Indian species, which has been previously recorded from the Florida Keys.
- Arvelius albopunctatus* DeG —One specimen from Matecumbe of this usual Floridian form.
- Podisus sagitta* Fabr.—This is a Texan and Mexican form, recorded from St. Augustine and Miami by Barber, represented herein by one specimen from Key Largo.
- Piezodorus guildinii* Westwood—Barber has already recorded this from Florida; there are three specimens from Homestead in this lot.
- Corizus hyalinus* Fabr.—There is one from Matecumbe in this lot; a wide-spread species, particularly to the south.
- Corizus* sp.—There are three specimens of a species undeterminable by Blatchley, taken at Matecumbe.
- Chondrocera laticornis* LaP.—There are nine from Matecumbe and one from Windly of this neotropical species.
- Euthochtha galeator* Fabr.—This wide-spread species is represented by two from Matecumbe and two from Key Largo.
- Chariesterus antennator* Fabr.—There is a long series of this common Eastern species from Matecumbe and Windly.
- Hyalymenus longispinus* Stål—This is a West Indian species represented by three from Matecumbe, three from Key Largo and one from Windly.

Harmostes reflexulus Say—There are three of this widespread species taken at Matecumbe.

Harmostes affinis Dallas—A common southern species represented by three from Matecumbe.

Aradus similis Say var. *centriguttatus* Bergroth—This species according to Blatchley is very common in central and southern Florida; represented from Homestead by one specimen.

Oncopeltus fasciatus Dallas—A long series from Matecumbe, some of which are teneral, indicating that at this time there are still nymphs to be found; this has been recorded from the Keys by Barber.

Oncopeltus sexmaculatus Stål—A neotropical form recorded from Florida by Blatchley and Barber; six from Matecumbe.

Nysius californicus Stål—There is one specimen from Matecumbe of this species which ranges from Connecticut in the East and Washington in the West into Texas and Mexico.

Nysius strigosus Uhler—There is one specimen from Matecumbe of this species heretofore reported only from Miami.

Ischnodemus rufipes Van Duzee—Of this species which appears to be restricted to Florida, there is one specimen from Matecumbe.

Orthoca (*Paromius*) *longula* Dallas—Of this species, known throughout Florida, extending from North Carolina into the West Indies and South America, there are three specimens from Matecumbe, one from Windly and one from Homestead.

Aphanus illuminatus Dist.—Two from Matecumbe of this species described from Mexico and Guatemala; and recorded by Barber from Florida.

Euryophthalmus davisii Barber—This species, described by Barber from Big Paris Key, is here represented by three specimens from Key Largo.

Dysdercus suturellus H. S.—The unfavorably known and widely distributed cotton stainer is represented by six specimens from Matecumbe and two from Homestead.

Acanthochila exquisita Uhler—This very interesting Tingid seems to be known only from the original description, from the type locality Cape Florida, Fla.; there is one specimen from Matecumbe in this lot.

Teleonemia belfragei Stål—This species seems to be known only from Florida and Texas; three from Key Largo.

Phymata fasciata (Gray) Blatch.—Recorded by Barber from Florida, *fide* Handlirsch; there are four here from Matecumbe, 2 from Homestead and one from Isla Morada.

Apiomerus spissipes Say—Two from Matecumbe of this widely distributed species.

Zelus bilobus Say—A widely distributed species, of which there are 63 from Matecumbe.

NOTES ON THE BIOLOGY OF METEORUS
HYPOPHLOEI CUSHM.

(Hymenoptera—Braconidae.)

BY DONALD DELEON, *Bureau of Entomology*¹

Muesebeck,² in his revision of the genus *Meteorus* Haliday, states that the species comprising this group are parasitic chiefly on lepidopterous larvae. *M. humilis* (Cress.), he adds, has been recorded as being parasitic on the coleopterous larva *Platydemia ellipticum* Fabr., a tenebrionid, and *Orchesia castanea* Melsh., a melandryid. He says, however, that the determinations of the hosts were somewhat doubtful, and that definite records are needed to establish this supposedly anomalous habit of some of the members of this genus. As a tenebrionid host for a species of this genus was definitely determined, and as the habits and seasonal history of *hypophloeii* differ somewhat from those of other species of *Meteorus*, the following notes are recorded, though the seasonal history was not studied in detail. For more complete accounts of the biology and morphology of species of this genus Muesebeck³ and Parker⁴ should be consulted.

The observations on *M. hypophloeii* were made while a study of the parasites and predators of the mountain pine beetle (*Dendroctonus monticolae* Hopk.) attacking western white pine (*Pinus monticola* Dougl.) was being conducted. The study was made near Metaline Falls, Washington, on the Kaniksu National Forest, which is in the extreme northeast corner of the state.

Acknowledgment is made to Mr. R. A. Cushman, of the taxonomic unit of the U. S. Bureau of Entomology, for the determination of this species, which he has recently described.⁵

¹ Resigned May, 1931.

² Muesebeck, C. F. W. A Revision of the North American Species of Ichneumon-Flies Belonging to the Genus *Meteorus* Haliday. Proc. U. S. National Museum 63: Art. 2, 1923. Washington, D. C.

³ Muesebeck, C. R. W. Two important introduced parasites of the brown-tail moth. Jour. Agr. Res. 14: 191-206, 1918.

⁴ Parker, H. L. Notes on *Meteorus* (*Zemiotes*) *nigricollis* Thomson, an occasional parasite of the European Corn Borer. Proc. Ent. Soc. Wash. 33: 93-103, 1931.

⁵ Cushman, R. A. Three new Braconidae parasitic on bark-beetles. Jour. Wash. Acad. Sc. 21: 301-304, 1931.

SEASONAL HISTORY AND HABITS

While subcortical insects associated with the mountain pine beetle were being looked for, yellowish cocoons were frequently found in the egg galleries of the beetle. The cocoons occurred both in trees which contained the brood of the beetle and in those from which the brood of the beetle had emerged. Alongside many of the cocoons, or affixed to them, were the collapsed larval skins of a species of *Hypophloeus*. The most abundant species of the genus found under the bark of trees killed by the mountain pine beetle was *H. parallelus* Melsh., and it is certain that many, if not all, of the skins belonged to the larvae of this species.

Some cocoons were found the first day of the field season, April 25, 1930. Of eight cocoons examined, seven contained larvae and one an adult. The adult was dead but rather moist, and appeared as though it had recently transformed. Five of the cocoons were saved for rearing and from these two males emerged between May 9 and 11 and one female between May 11 and 12. The female was fed sugar water, and though it remained alive until May 29, it would not oviposit on any *Hypophloeus* larvae. Two more cocoons were collected May 19; a male emerged from one between May 22 and 26 and a female from the other May 27. Though the female was fertilized by the male as soon as both were placed together, she refused to oviposit on the *Hypophloeus* larvae placed with her, and died on June 5. The male died May 30. Later, the larvae of *Dendroctonus monticolae*, a species of *Hypophloeus*, and a species of *Rhizophagus* (a small subcortical larva similar in size and shape to a *Hypophloeus* larva) were secured and placed with several females of *Meteorus* that had been collected in the field. However, none of these would oviposit on the larvae nor would they pay any attention to them.

About two months later an attempt at oviposition was observed. Three *Hypophloeus* larvae and a female *Meteorus* had been placed in a Syracuse watch glass, the bottom of which had been covered with paper to give footing to the insects. The braconid sensed immediately the presence of the larvae. She ran up to one of them and rapidly, almost feverishly, vibrated her antennae over its dorsal surface, and at times felt the surface first with one antenna and then with the other. The larva during this time continued to move rapidly around the edge of the paper, and the female kept abreast of it by moving sidewise. Suddenly, still facing the larva, she bent her abdomen forward between her legs and

attempted to pierce its venter with her ovipositor, but the larva gave a sudden twist and apparently "scared" her off.

Subsequently, under the same conditions, females were observed to oviposit many times in *Hypophloeus* larvae. Each time before oviposition they went through the same maneuvers described above. Oviposition occurred in previously parasitized as frequently as in apparently unparasitized larvae. In the field, however, only one parasitic larva was found to emerge from its host at maturity. Females would not oviposit in dead *Hypophloeus* larvae, or in larvae which were not moving. Though the parasite would become excited and dash up to an inactive larva, she lost interest immediately if it did not begin to move when it was touched with her antennae.

The parasite inserts her ovipositor in any portion of the venter of the larva, but most often, it appeared, in the region of the first abdominal segment. Larvae that had been punctured as many as six times showed no ill effects from the operation at any period. The act of oviposition required usually no more than a second, though occasionally, when the female had difficulty in extracting her terebra, it took a second or two longer. It was not determined whether or not the parasite selects larvae of a certain instar.

Eight active and apparently normal and full-grown *Hypophloeus* larvae were collected August 18 and placed in a vial for rearing. Between August 29 and 30 one parasitic larva emerged from one of the larvae of the beetle, but before a cocoon could be spun by the larva of the parasite it was fed on by one of the remaining beetle larvae. The larval skin of the parasitized tenebrionid was in the characteristic deflated form.

Meteorus adults (Pl. IV) were observed on certain trees from about the middle of June up to the end of the first season, September 23. They were especially common about the middle of July on one tree and the forepart of September on another. Both trees had been attacked by the mountain pine beetle the previous year, and *Hypophloeus* larvae were fairly abundant beneath the bark of each. On other trees, attacked the same season, no *Meteorus* adults were found, and in these trees the tenebrionid larvae seemed as abundant as in the other two.

The adults are very active, though when disturbed they usually escape by running rather than by flying. They work over the tree apparently in search of *Hypophloeus* larvae, crawling on the surface of the bark. None of the parasites had been observed under the bark in the egg galleries of the mountain pine beetle.

The egg is practically colorless. Its surface is smooth and

resembles a soap bubble in appearance. It is oval in shape, with a slight, nipple-like projection at one end. At the opposite end it is drawn out into a tapered stalk about one-third as long as its main portion. The eggs dissected from the *Hypophloeus* larvae averaged slightly over 0.35 mm. in length and 0.1 mm. in width.

The incubation period, though not definitely determined, probably occupies more than one day but less than five. A larva which was dissected twenty-four hours after it was parasitized still contained the egg unhatched; another larva dissected 116 hours after it was parasitized contained a larva 1.25 mm. in length.

The larva observed was of the caudate type. The head occupied about three-twentieths of the length of the body; the tail-like segment, four-twentieths. The mandibles were indistinct but appeared to be set far apart and were slightly sclerotized. The tail-like segment bore numerous rather coarse spines, which appeared to be more numerous on the dorsal surface. These were not visible on the other body segments. The first-instar larva of *Meteorus nigricollis* lacks these spines (Parker, *op. cit.*). The full-grown larva is hymenopteriform and averages about 4.5 mm. in length. The head capsule bears the same type of sclerotized design in the buccal region that is found on other full-grown braconid larvae, and numerous very minute spines are present on all the body segments.

The pupal stadium was not determined, and the pupal stage not observed.

Adults of the species were collected in Montana also. A female was reared from a cocoon collected under the bark of lodgepole pine infested with the mountain pine beetle near Sula. The cocoon was collected May 24, 1929, and the adult emerged between June 6 and 7, 1929. Several adults were also collected in August on the bark of trees infested the previous year, and on trees recently infested. No other information was secured regarding its biology in this locality.

SUMMARY.

(1) *Meteorus hypophloeici* Cushman is a primary, internal, solitary parasite of the larvae of *Hypophloeus parallelus* Melsh. and probably other associated *Hypophloeus* larvae in northeastern Washington and southwestern Montana.

(2) Adults were reared in May from the cocoons collected the latter part of April, but no parasitism of the larvae of *Hypophloeus* could be secured until August. There is probably but one

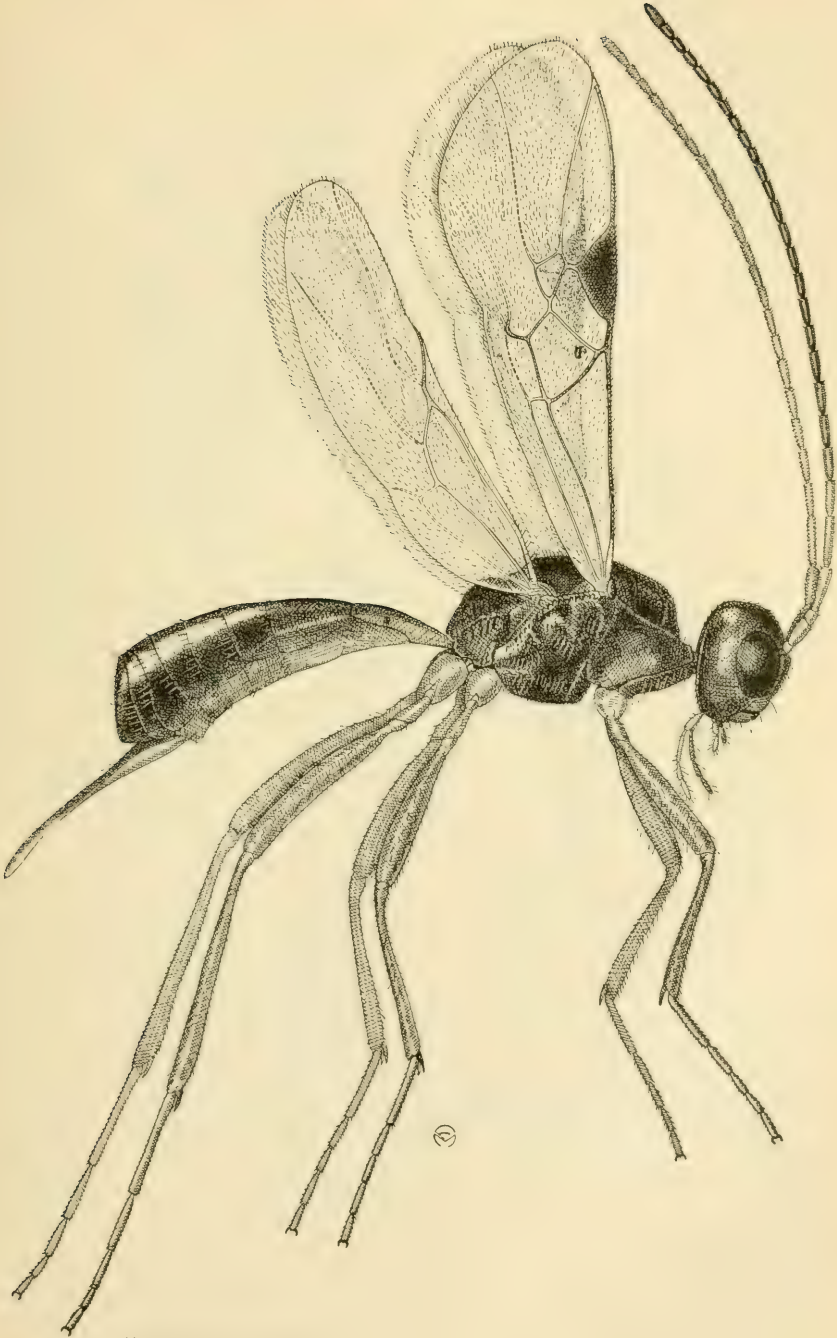
generation a year, the parasite overwintering in the larval stage within a cocoon.

(3) Larvae of the parasite emerged from *Hypophloeus* larvae in August.

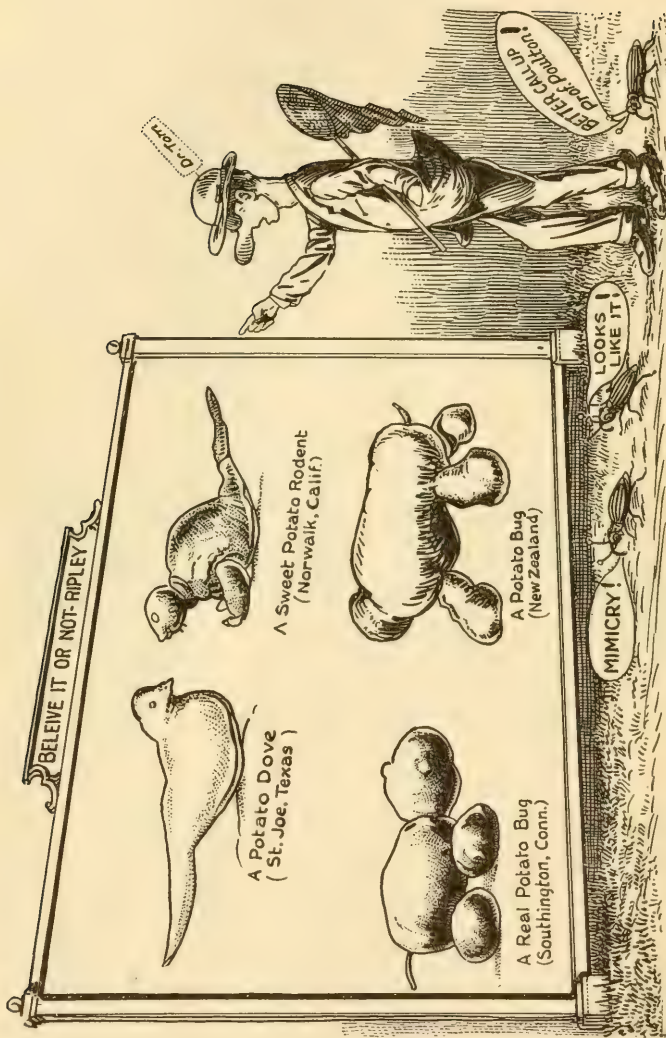
(4) The egg, first-instar larva, and full-grown larva are briefly described, but the full seasonal history was not determined.

Calosoma Escaping by Diving.—Reading the “Touching Tale of the Quaking Quag” by Mr. Frost in the October BULLETIN reminded me of another case in which a beetle was observed to seek safety under water. One summer day several years ago, while sitting on a boulder on the beach of Northern Lake Michigan waiting for a boat to pick me up, I idly turned over the stones within reach to see what had taken shelter beneath them. From under one darted a specimen of *Calosoma calidum*, and in its haste to escape appeared to fall into the water filled cavity from which a deeply embedded stone had been removed. As the beetle failed to appear on the surface after several minutes, with my fingers I explored the muddy water which was several inches deep, and found it under a small stone on the bottom. When released on the beach it immediately darted back into the same cavity. For nineteen minutes by my watch I waited but it did not come to the surface. My boat had then arrived, but before leaving I again retrieved the beetle which seemed none the worse for its submersion, and when released, for the third time again sought its underwater retreat.—SHERMAN MOORE, Detroit, Michigan.

Records of Connecticut Heteroptera.—On August 10, 1931, I spent an hour or so on the shores of Lake Candlewood, in Connecticut, some ten miles from Danbury. This is an artificial body of water, for power production; it consists largely of drowned valleys and has a periphery of some thirty miles of shore line. The growth swept was the usual Eastern summer vegetation of this latitude—grasses, *Daucus carota*, *Asclepias*, *Rubus* spp., etc. The bugs taken in ones and twos (all new records for the State), were: *Corimelaena pulicaria* Germ., *Neottiglossa undata* Say, *Mormidea lugens* Fabr., *Orsillus scolopax* Say, *Zeridoneus costalis* Van Duzee, *Nabis subcoleoptratus* Kirby, *Sinea diadema* Fabr., *Phymata erosa* Wolff, and *Miris dolabratus* Linne.—J. R. DE LA TORRE-BUENO, White Plains, N. Y.



Meteorus hypophloeae Cushman



Mimicry Business or Monkey Business—Gunder.
(Text on opposite page.)

MIMICRY BUSINESS OR MONKEY BUSINESS.

By J. D. GUNDER, Pasadena, Calif.

"Well, I'll be a gol darned Mallophaga!" exclaimed Dr. Tom, as he surveyed one of Mr. Ripley's new sign boards which had been put up in the neighborhood. "Imagine potatoes being able to imitate birds and bugs. Just look at those pictures! They got everything including eyes, ears, noses and sex appeal. There *must be* something to this mimicry business after all." Come to think of it, our common garden vegetables have as much right to try and better themselves as our common insects. I've heard of monkeys imitating men and men making perfume so their women could smell like lilies, but I never thought they would breed potatoes with savvy enough to grow legs and wings! I'll have to put an adv. in the Exchange page of the BULLETIN, so I can get hold of one of those big fellows like he illustrates from New Zealand. Maybe a genitalic slide would show it to be a new "mimetic form"! Entomologically, I have heard that there was such a thing as a "mimetic form." However, I am not going to throw away my net, buy a shovel and go digging for new species until I find out. Maybe these potatoes are not real examples of so-called mimicry after all, but are just strange flukes of "convergent evolution," which means that creatures only remotely related to each other come to look like twins. But don't take my word for it; I'm no vegetarian! However, I feel that these potato-bug pictures represent a deep problem in mimetic analogy and that the proposition should be called to the attention of either Professor Poulton or Sherlock Holmes. Mr. W. L. McAtee, of the U. S. Biological Survey, thinks that *mimicry* in insects, that is, the trick of looking like a dangerous or ill-tasting species or of camouflaging oneself as a leaf or a twig, *is not the prop of evolution it was once thought to be*. In his Smithsonian Publication No. 3125, he gives the results of a long series of studies conducted on the stomachs of birds, determining the numbers and proportions of supposedly *protected* insects eaten by them. Beetles are taken as one example of the failure of various protective devices. Some of them are mimics. Others have powerful, ill-smelling secretions which are supposed to repel their enemies. Still others have hard shells. Yet, Mr. McAtee says, the birds eat them all! Now folks, what do you think of that? And don't forget that old Dr. E. N. Tom Ology lets the chips fall where they may."

BOOK NOTES.

Medical Entomology, by Robert Matheson, Ph.D. Pp. i-xii + 1-489, 6 portraits in 2 frontispiece plates, not numbered, and figs. 1-211. (Charles C. Thomas, Springfield, Ills., 1932. \$5.)

This work includes not only the insects proper, *i.e.*, the Hexapoda, but also the other Athropoda which are vectors of infections. The entire field is surveyed in twenty chapters. The first chapter, on Arthropods and human disease, gives a brief historical account of medical entomology, its rise and progress; enumerates the principal insect-borne diseases and the manner of their transmission; defines sundry terms; and concludes with a list of references of the more important journals, reference books and texts. Each chapter is similarly followed by a most useful list of references. Chapter II is a necessarily brief exposition of the Arthropods in general, including Crustacea, Arachnida and Acarina; with a synopsis of the last. In chapters III and IV, the Acarina, their characteristics, habits and anatomy, and the diseases they convey are dealt with; and synopses of the groups are given. The fifth chapter introduces the Hexapoda in a similar manner. Since insects are more abundant both as to species and numbers, they are dealt with in the thirteen chapters following, according to their respective Orders. Naturally, the Diptera are given the most extensive treatment in ten of these chapters; the other three refer to the Hemiptera, Anoplura and Siphonaptera. Chapter XIX treats of urticating and poisonous Arthropods—scorpions, spiders, centipedes, stinging insects, vesicatory beetles and urticating caterpillars. The closing chapter gives brief directions for collecting, preserving and mounting insects. An Author Index of 4 pages in 3 columns, and a Subject Index of 13 pages complete the work.

One striking fact that emerges from the bibliographies at the end of the chapters is the enormous amount of work in pure entomology, including taxonomy, that is appearing in journals seldom seen by an entomologist pure and simple, no matter how wide his reading. In the Hemiptera, for instance, there are 11 references out of a total of 36 from non-biological journals by non-entomologists; three of these articles are by occasional entomologists in the medical profession. This would seem another complication added to an already sufficiently abstruse biological discipline.

This is a fine, well-printed, highly useful and valuable work to any entomologist working in the groups of which it treats, even though there be no medical aspect in the studies being conducted.
—J. R. T.-B.

PROCEEDINGS OF THE SOCIETY.

MEETING OF MAY 12, 1932.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday, May 12, 1932, at 8.20 p. m. President Davis in the Chair, and 17 other members present, *viz.*, Messrs. Ballou, Bell, Eisenhardt, Engelhardt, Lacey, Lemmer, Lerch, Moennich, Nicolay, Pollard, Schaeffer, Sheridan, Shoemaker, Siepmann, Torre-Bueno, Wilford, and Wurster, and three visitors, including Messrs. Nadeau and Stecher.

The minutes of the previous meeting were read and approved. Mr. Torre-Bueno reported at length for the publication committee.

Mr. Schaeffer proposed for membership Mr. Raoul Nadeau, 10 Argyle Road, Brooklyn, New York. Mr. Nadeau being present, it was regularly moved and seconded that the By-laws be suspended, and the secretary was directed to cast one ballot for his election, which was accordingly done.

A copy of the new enlarged edition of Riley and Johannsen's Medical Entomology was exhibited by Mr. Torre-Bueno.

Mr. Schaeffer exhibited a series of over seventy specimens of the Cerambycid beetle, *Romaleum rufulum*, collected by Mr. Weeks in East New York. The specimens showed considerable variation in the form of the elytral apices. There is one spine at the sutural apical angle and usually another at the outer apical angle, though in the series of specimens shown by Mr. Schaeffer the latter was variable, being sometimes more or less feebly evident or entirely lacking. The specimens with the outer spine lacking were described by Casey as *mancum*, but this series, with its intermediate forms, clearly shows it to be only an individual variation of *rufulum*. At the same time Mr. Schaeffer presented three Long Island records in the same family: *Romaleum hispicorne*, collected by Mr. Schott at Fire Island, and new to New York; *Anoplium cinerascens*, a new Long Island record, and *Tylonotus bimaculatus*, taken at Flushing, Long Island, by Kenneth W. Cooper.

Mr. Bell told of the experiences of Mrs. Bell and himself on a collecting trip to the island of Jamaica, B. W. I., during March and April, 1931. He exhibited specimens of twenty-one species of *Hesperiidae*, twenty of which he collected during his stay on the island and remarked on their characteristics and habits and pointed out the differences between these specimens and those found on the main-land and other islands. Among the species ex-

hibited was *Choranthus lilliae*, which he has described from specimens taken at Bath, St. Thomas Parish, where he found it very locally restricted in the upper part of the gorge. He also exhibited a female specimen of the rare *Epargyreus perkinsi* recently described by Mr. W. J. Kaye, of London, England, and which was captured by Miss Lilly Perkins. He told of the very excellent collecting at light for both moths and beetles at Baron Hill, Trelawny Parish, and at Constant Spring, St. Andrew Parish. He found excellent collecting from sea-level up to 1,200 feet altitude but higher than that it was not as good, owing to very cool weather and frequent rains. He also exhibited a number of photographs showing scenes in some of the localities visited.

Mr. Davis exhibited a collection of cicadas from various parts of the world, including a number of large and beautiful species, which he had obtained from Mr. Eisenhardt.

Mr. Moennich, reporting for the field committee, stated that six members appeared for the May 1st trip, but it started to rain while the party was on their way to Richmond. Since it was no longer possible to do any collecting, at the invitation of Mr. Davis, they visited the Perrine House, and in the afternoon went to the Attic Club, in the Staten Island Museum, where Mr. Davis showed his collection. A collecting trip was planned for May 14th, to Alley Pond Park, Douglaston, Long Island.

Mr. Engelhardt exhibited some specimens of a species of *Cryptocephalus*, which emerged from some larvae he collected on the first or second of January in a cypress swamp near New Orleans. The larvae, which are case bearers, were numerous beneath bark. Mr. Schaeffer, who examined the specimens, said he could not place them with any species known to him, and thought they might represent a new species.

Mr. Wurster exhibited some moths, including a specimen of *Automeris io* variety *lilith*.

The meeting adjourned at 11.10 p. m.

CARL GEO. SIEPMANN,
Secretary.

Vol. XXVIII

APRIL, 1933

No. 2

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

NEW SERIES



PUBLICATION COMMITTEE

J. R. de la TORRE-BUENO, Editor

CARL GEO. SIEPMAN

GEO. P. ENGELHARDT

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NOTES ON THE LIFE HISTORY OF JALYSUS SPINOSUS

BY CYRIL E. ABBOTT, Morgan Park, Ill.

In August, 1931, while crossing a field pink with the blossoms of *Gaura biennis*, I suddenly discovered a multitude of slender bugs with legs and antennae as attenuated as hairs. Specimens in various stages of development appeared to be feeding on *Gaura*. The adults were copulating in the peculiar "tail-to-tail" manner characteristic of Hemiptera. Further search revealed the presence of eggs.

A little library research identified this bug as *Jalysus spinosus*, and the absence of biological data on this insect encouraged me to write the following account.

The eggs are found singly, chiefly on flower clusters, and especially on the green fruits of *Gaura*. They are oval-elongate, measuring approximately 0.6 by 0.2 mm. One end bears four little, incurved hooks, each ending in a slight enlargement (Fig. 1). The presence of two scarlet spots (the eyes) at this end of the egg advertise that the young bug is about to emerge.

Stadium I. With scarcely perceptible movements the insect emerges from the egg. One that was observed required twenty-seven minutes for this process. With optical aid a not very distinct "cephalic heart" is visible. The head appears first; the tips of the antennae, legs, and abdomen, last. Ecdysis follows the same general plan, excepting that the thorax precedes the head.

The young bug is, like the egg, orange in color, and translucent. Its "profile" is like that of a crude letter S lying on its side (Fig. 2). The abdomen and thorax are nearly equal in size. Just before the first ecdysis the length of the body has increased to 1.0 mm.

Stadium II. The fourth day after hatching ecdysis occurs. The bugs are then yellow-green with the tip of the head orange.

Appendages darken somewhat with age. The head becomes straighter but the abdomen is still "bowed" dorsoventrally. The eyes, as in all stages excepting the adult, are bright scarlet. Before the next ecdysis length increases to 2.0 mm. and the width to 0.5 mm.

Stadium III. During the seventh day ecdysis again occurs. The insect is now pale green in color with a mid-dorsal white line extending from the frons to the tip of the abdomen, and two dorso-lateral lines extending the length of the abdomen. The latter has become almost straight and of adult proportions. The average length of the body at the end of this stage is 3.0 mm.

Stadium IV. On the tenth day a third ecdysis takes place. The green color persists; the white lines are very distinct. The median line widens at its anterior end to form a spot. The "bowed" condition has practically disappeared, while appearance is further modified by the presence of wing-pads. The length of the body is 4.8 mm., the width 1.0 mm. After this stage there is practically no increase in width.

Stadium V. Ecdysis is repeated on the thirteenth day. The wing-pads increase in size. The average length is 5.8 mm. (Fig. 3).

Adult. On or about the sixteenth day the bug makes its last ecdysis. Recently emerged specimens are pale green with nearly white hemelytra, but in three hours the body has assumed a chocolate color with the hemelytra gray-brown. The distal segment of the proboscis, the distal segment of each antenna, and the tarsi, are black. The eyes are red-brown. The median pale line persists. The remaining markings are too complex for description here. The average length of the adult body is 7.0 mm., the width 1.0 mm. Females are a little broader than males (Fig. 4).

The insect appears to feed exclusively on *Gaura*; at least this plant was all that was found necessary to bring insects to maturity.

The binocular magnifier which enabled the author to construct the drawings was kindly supplied by the Illinois School of Pharmacy through Mr. Paul Carpenter.

PLATE

- Fig. 1. Egg of *Jalysus spinosus*. $\times 40$.
- Fig. 2. *J. spinosus* as it emerges from egg. $\times 40$.
- Fig. 3. Pre-adult or nymphal form of *J. spinosus*. $\times 40$.
- Fig. 4. *J. spinosus*, adult. $\times 40$.

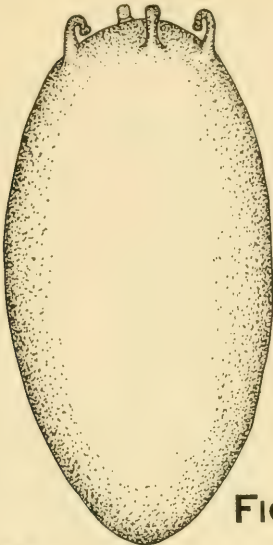


FIG. 1

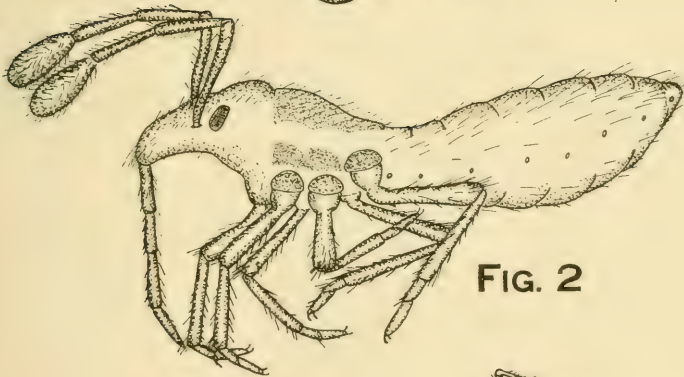


FIG. 2

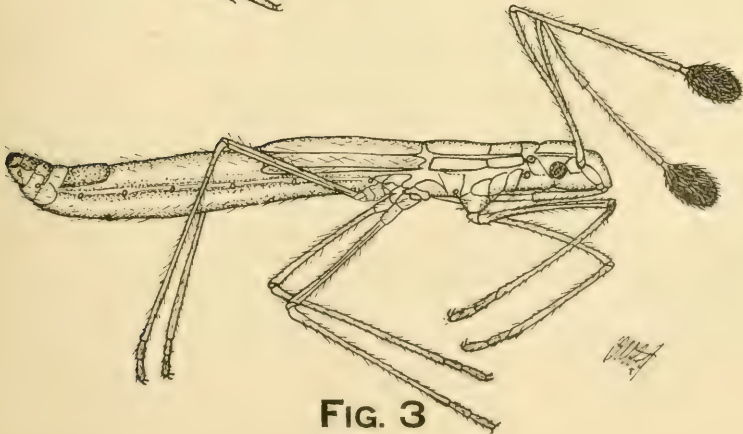


FIG. 3

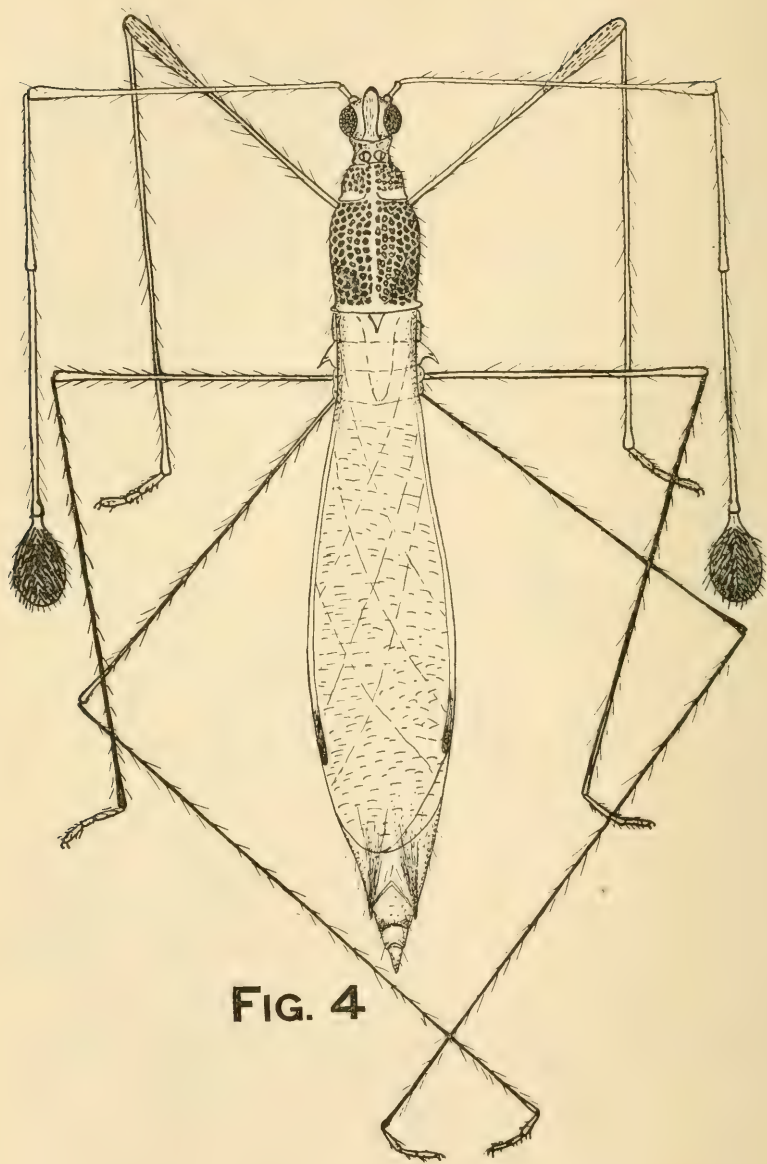


FIG. 4

TRAP COLLECTIONS OF INSECTS IN COTTON IN 1932.

By J. C. GAINES, Texas Agricultural Experiment Station,
College Station, Texas.

Cotton fields are known to harbor large numbers of insects, some of which cause severe injury, making it imperative that the planters use control measures for the economical production of this staple crop. In this locality, insect injury to cotton was noted throughout the season. Early in the spring the seedling cotton was injured by thrips. Later in the season, during June and July, hemipterous insects were abundant, causing the excessive shedding of squares. Among this group of pests, *Psallus seriatus* (Reut.) and *Adelphocoris rapidus* (Say) were the most important. *Heliothis obsoleta* Fab. and *Alabama argillacea* Hbn. were fairly numerous during July and August, causing injury to both the fruit and foliage. *Anthonomus grandis* Boh. became numerous and infested practically all the squares by early September.

The life histories and economic status are not known for a number of species that inhabit cotton fields. The 199 species, listed herein, representing 61 families, were captured on a screen trap located in a cotton field in the Brazos river bottoms, Burleson county, Texas. As this trap did not have any qualities that would attract insects, it is believed that these collections represent a good sample of the insect fauna, with the exception of Lepidoptera and Hymenoptera, that inhabited or was flying through the cotton during the growing season.

The trap, from which these collections were taken, was constructed by tacking a piece of ordinary screen wire to a 5' x 3' frame. The ends of two of these frames were nailed together and to three posts placed in the ground in a triangular arrangement, the two frames forming a right angle with the bottom edge about three feet above the ground. The wire was thickly coated at regular intervals with a sticky tree banding preparation. All insects were taken from this trap once a week, during the period from June 15 to August 31, 1932, and cleaned with terpineol before mounting.

This list contains a number of species that have not been recorded from this state, as well as the record on the various species that occur in cotton fields. The writer is indebted to the following specialists for naming some of the insects in this list:

H. J. Reinhard, Dr. E. A. Chapin, L. L. Buchanan, H. S. Barber, Dr. R. K. Fletcher, Wm. T. Davis, H. G. Johnston, S. W. Bromley, N. A. Donges, W. S. Fisher, C. F. W. Muesebeck, S. A. Rohwer, Grace Sandhouse, and W. M. Mann.

ORTHOPTERA

Family LOCUSTIDAE

Melanoplus differentialis (Th.) (2)¹

NEUROPTERA

Family CHRYSOPIDAE

Chrysopa plorabunda Fitch (1)

THYSANOPTERA

Family THIRIPIDAE

Frankliniella tritici (Fitch) (1) *Chirothrips mexicanus* Crawford (1)

Family PHLOEOTHIRIPIDAE

Haplothrips sp. (1)

HEMIPTERA

Family SCUTELLERIDAE

Camirus porosus (Germ.) (1, 2)

Family PODOPIDAE

Oncozygia clavicornis Stål. (2)

Family CORIMELAENIDAE

Galgupha aterrima Mal. (2) *Corimelaena pulicaria* (Germ.) (2)

Family CYDNIDAE

Annestus pusillus Uhl. (2)

Family PENTATOMIDAE

Trichopepla semivittata (Say) *Thyanta custator* (Fabr.) (2)
(2) *Thyanta antiquensis* (West.)

Chlorochroa uhleri Stål. (2) (2, 3)
Solubea pugnax (Fabr.) (2, 3) *Podisus acutissimus* Stål. (3)

Family CORIZIDAE

Harmostes fraterculus (Say) *Corizus hirtus* Bueno (2, 3)
(2) *Jadera haematoloma* (H. S.)
Corizus lateralis (Say) (2) (2)

¹ Numbers in parenthesis after each species indicate the date of collection; i.e., (1) June, (2) July, and (3) August.

Family LYGAEIDAE

Nysius ericae (Schill.) (1, 2, 3) *Geocoris punctipes* (Say) (1, 2, 3)
Blissus leucopterus (Say) (3)
Orthaea bilobata (Say) (2) *Ozophora picturata* Uhl. (2)

Family REDUVIIDAE

Melanolestes abdominalis (H. Zelus laevicollis Champ. (2)
S.) (2)

Family NABIDAE

Nabis alternatus Parsh. (2)

Family ANTHOCORIDAE

Orius insidiosus (Say) (I, 2)

Family MIRIDAE

<i>Neurocolpus nubilus</i> (Say)	<i>Lygus pratensis</i> (Linn.) (2)
(2)	<i>Sixeonotus areolatus</i> Knight
<i>Phytocoris</i> sp. (2)	(2)
<i>Adelphocoris rapidus</i> (Say) (2,	<i>Ceratocapsus fuscusignatus</i>
3)	Knight (2)
<i>Polymerus basalis</i> Reut. (2)	<i>Psallus seriatus</i> (Reut.) (1, 2,
<i>Lygus olivaceus</i> Reut. (2)	3)

HOMOPTERA

Family CICADIDAE

Tibicen superba (Fitch) (1) *Pacarina puella* Davis (1)

Family MEMBRACIDAE

<i>Stictocephala inermis</i> (Fabr.) (2)	<i>Vanduzeia triguttata</i> (Burm.) (1)
<i>Stictocephala festina</i> (Say) (2)	<i>Enchenopa binotata</i> (Say) (2)
<i>Micrutalis calva</i> (Say) (2)	

Family CICADELLIDAE

<i>Agallia cinerea</i> O. & B. (1)	<i>Deltocephalus sayi</i> (Fitch) (2)
<i>Oncometopia undata</i> (Fabr.) (1)	<i>Euscelis obscurinervis</i> (Stål.) (1, 2, 3)
<i>Oncometopia lateralis</i> (Fabr.) (2)	<i>Eutettix seminudus</i> (Say) (2)
<i>Homalodisca triquetra</i> (Fabr.) (1, 2, 3)	<i>Eutettix cinctus</i> O. & B. (1)
<i>Kolla hartii</i> (Ball) (1, 2)	<i>Eutettix strobili</i> (Fitch) (2, 3)
<i>Draeculacephala reticulata</i> (Sign.) (1, 2, 3)	<i>Phlepsius excultus</i> (Uhl.) (2)
<i>Gypona rugosa</i> Spangb. (1, 2)	<i>Phlepsius irroratus</i> (Say) (2)
<i>Gypona scarlatina</i> Fitch. (2, 3)	<i>Thannotettix nigrifrons</i> (Forbes) (2)
<i>Xerophloea viridis</i> (Fabr.) (1)	<i>Thannotettix inornatus</i> V. D. (2)
<i>Xerophloea major</i> Bak. (2)	<i>Chlorotettix viridius</i> V. D. (2)
<i>Platymetopius acutus</i> (Say) (2)	<i>Chlorotettix</i> sp. (2)
<i>Platymetopius loricatus</i> Van D. (2)	<i>Erythroneura tricineta</i> Fitch (2)

Family FULGORIDAE

- Scolops sulcipes* (Say) (2) *Acanalonia conica* (Say) (2)
Oliarus aridus Ball (2, 3)

COLEOPTERA

Family CICINDELIDAE

- Cicindela punctulata* Oliv. (1)

Family CARABIDAE

- Dyschirius haemorrhoidalis* *Tetragonoderus fasciatus* Hald.
 Dej. (1) (2)
Clivina bipustulata (Fabr.) (1) *Calceida punctulata* Chd. (1)

Family STAPHYLINIDAE

- Philonthus hepaticus* Er. (1) *Tachyporus chrysomelinus* (L.)
Philonthus alumnus Er. (2) ? (1)

Family LAMPYRIDAE

- Photinus scintillans* (Say) (1, 2)

Family CANTHARIDAE

- Chauliognathus scutellaris* Lec. *Belotus abdominalis* (Lec.) (1)
 (1, 2)

Family MELYRIDAE

- Collops quadrimaculatus* *Collops balteatus* Lec. (1, 2)
 (Fabr.) (1, 2)

Family CLERIDAE

- Cymatodera undulata* var. *brun-* *Enoclerus* sp. (2)
nea Spin. (2)

Family CORYNETIDAE

- Chariessa pilosa* var. *marginata* Say (1)

Family OEDEMERIDAE

- Oxaxis pallida* (Les.) (1, 2, 3)

Family MORDELLIDAE

- Mordella atra* Melsh. (2) *Mordellistena* sp. (2)
Mordellistena pustulata
 (Melsh.) (1)

Family MELOIDAE

- Epicauta callosa* Lec. (2)

Family ANTHICIDAE

- Notoxus monodon* Fab. (1, 2)

Family ELATERIDAE

- Monocrepidius vespertinus* (Fabr.) (1, 2, 3) *Melanotus communis* (Gyll.) (1, 2)
Glyphonyx recticollis (Say) (1, 2, 3)

Family BUPRESTIDAE

- Acmaeodera pulchella* (Hbst.) (2) *Chrysobothris femorata* (Oliv.) (1, 2, 3)
Buprestis rufipes (Oliv.) (2) *Agrilus egeniformis* Ch. & Kn. (2)

Family NITIDULIDAE

- Carpophilus dimidiatus* (Fabr.) (2)

Family LATHRIDIIDAE

- Melanophthalma simplex* Lec. (2)

Family PHALACRIDAE

- Phalacrus seriatus* Lec. (2)

Family COCCINELLIDAE

- Hyperaspis binotata* (Say) (2) *Hippodamia convergens* Guér. (1, 2, 3)
Hyperaspis fimbriolata subsp. marginatus Ga. (1, 2) *Cycloneda sanguinea* (L.) (1, 2)
Hyperaspidius pallidus Csy. (2) *Cycloneda sanguinea* var. *immaculata* (Fab.) (1)
Scymnus creperus Muls. (1) *Olla abdominalis* (Say) (1, 2, 3)
Scymnus cinctus Lec. (1, 2) *Olla abdominalis* var. *plagiata* Csy. (1)
Scymnus intrusus Horn (1) *Chilocorus bivulnerus* Muls. (2)
Scymnus terminatus Say (1) *Exochomus marginipennis* var. *childreni* Muls. (1, 2, 3)
Psyllobora 20-maculata (Say) (1) *Ceratomegilla fuscilabris* (Muls.) (1)

Family TENEBRIONIDAE

- Tribolium ferrugineum* (Fabr.) (2)

Family ANOBIIDAE

- Lasioderma serricorne* (Fabr.) (2) *Eupactus obsoletus* Fall (2)
Catorama confusum Fall (2)

Family SCARABAEIDAE

- Onthophagus pennsylvanicus* (Har. 1, 2) *Trigonopeltastes delta* (Forst.) (2)
Ataenius cognatus (Lec.) (2)

Family CERAMBYCIDAE

<i>Smodicum cucujiforme</i> (Say)	<i>Neoclytus acuminatus</i> (Fabr.)
(1)	(2)
<i>Neoclytus scutellaris</i> (Oliv.)	<i>Leioptus fascicularis</i> (Harris)
(1)	(3)
<i>Neoclytus mucronatus</i> (Fabr.)	<i>Hippopsis lemniscata</i> (Fabr.)
(2)	(1)
	<i>Oberea quadricollis</i> Lec. (1)

Family CHRYSOMELIDAE

<i>Nodonota texana</i> Schffr. (1)	<i>Cerotoma trifurcata</i> (Forst.)
<i>Fidia viticida</i> Walsh (2)	(2, 3)
<i>Myochrous denticollis</i> (Say)	<i>Oedionychis miniata</i> (Fabr.)
(2, 3)	(2)
<i>Typophorus viridicyaneus</i>	<i>Disonycha crenicollis</i> (Say)
(Cr.) (1, 2)	(2)
<i>Paria canella</i> var. <i>quadriguttata</i>	<i>Disonycha abbreviata</i> Melsh.
Lec. (1, 2)	(2, 3)
<i>Lina scripta</i> (Fabr.) (2)	<i>Haltica nana</i> Cr. (1, 2)
<i>Diabrotica duodecimpunctata</i>	<i>Haltica amoena</i> Horn ? (2)
(Fabr.) (1, 2, 3)	<i>Lactica tibialis</i> (Oliv.) (1)
<i>Diabrotica vittata</i> (Fabr.) (1,	<i>Epitrix parvula</i> (Fabr.) (1)
2, 3)	<i>Chirida guttata</i> (Oliv.) (1)
	<i>Metrioria bicolor</i> (Fabr.) (1)

Family MYLABRIDAE

Mylabris obtectus Say (1, 2, 3)

Family PLATYSTOMIDAE

<i>Brachytarsus alternatus</i> (Say)	<i>Brachytarsus ? sticticus</i> Boh.
(2)	(1)

Family CURCULIONIDAE

<i>Apion metallicum</i> Gerst. (1)	<i>Cylindrocopturus adspersus</i>
<i>Eudiagogus pulcher</i> Fabr. (2)	(Lec.) (2)
<i>Macrorhoptus estriatus</i> Lec.	<i>Conotrachelus naso</i> Lec. (1)
(1)	<i>Conotrachelus posticatus</i> Boh.
<i>Anthonomus grandis</i> Boh. (2)	(1)
<i>Anthonomus</i> sp. (near <i>albopilosus</i> Dtz.)	<i>Calandra oryzae</i> (L.) (1, 2)
<i>Baris aerea</i> (Boh.)	<i>Gasterocercus</i> sp. (2)
<i>Baris</i> sp. (2)	(Heretofore not reported from U. S.)

DIPTERA

Family TABANIDAE

<i>Silvius quadrivittatus</i> Say (1,	<i>Tabanus costalis</i> Wied. (2)
2, 3)	<i>Tabanus sulcifrons</i> Macq. (2,
<i>Chrysops flavidus</i> Wied. (2)	3)

Family THEREVIDAE

Psilocephala haemorrhoidalis Macq. (2)

Family ASILIDAE

Atomosia melanopogon Herm. *Atomosia puella* Wied. (1)
(1, 2) *Erax aestuans* L. (2)

Atomosia muscida O. S. (1, 2)

Family SYRPHIDAE

Allograpta obliqua Say (1)

Family TACHINIDAE

Cistogaster immaculata Macq. (1)

Family SARCOPHAGIDAE

Senotainia rubriventris Macq. *Phytodes hirculus* Coq. (1)

Family MUSCIDAE

Pseudopyrellia cornicina Fabr. (1) *Stomoxys calcitrans* L. (1, 2, 3)

Musca domestica L. (1, 2, 3) *Lyperosia serrata* Desv. (1)

HYMENOPTERA

Family ARGIDAE

Sterictiphora lineata (Roh.) (1)

Family BRACONIDAE

Chelonus texanus Cress. (1, 2)

Family PERILAMPIDAE

Perilampus n. sp. (I)

Family CHALCIDIDAE

1. *Spilochalcis torvina* (Cress.) *Trigonura* sp. (1)

Family CHRYSIDIDAE

Chrysis sp. (1, 2)

Family MUTILLIDAE

Dasymutilla sp. (1, 2)

Family SCOLIIDAE

Campsomeris plumipes (Drury) (2)

Family FORMICIDAE

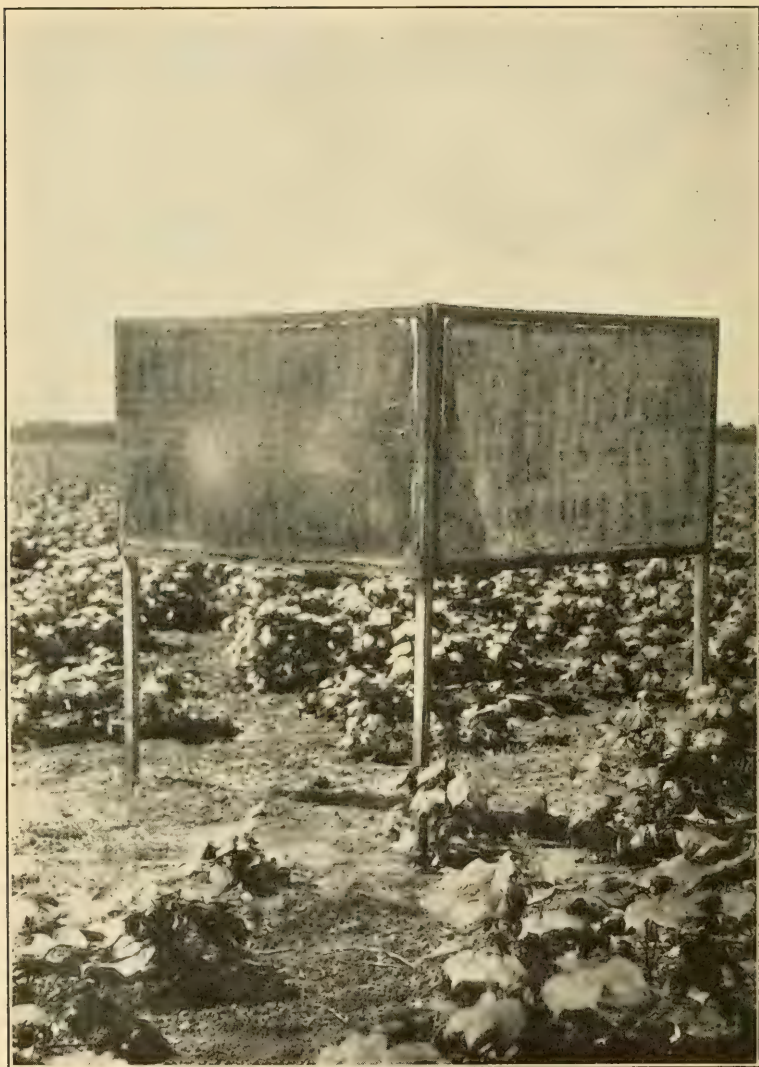
Iridomyrmex analis Andre (1,
2) *Prenolepis* sp. (1)
Pogonomyrmex sp. (1, 2)

Iridomyrmex sp. (1)

Family ANDRENIDAE

Calliopsis andreniformis Sm. *Halictus (Chloralictus) zephyrus* Sm. ? (1, 2)

Halictus (Chloralictus) tegularis Robt. (1, 2)



Type of Trap Used to Capture Insects.

NEW GENERA AND SPECIES OF THYSANOPTERA FROM SOUTH AFRICA.

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(Continued from p. 20).

***Pseudocryptothrips proximus* spec. nov.** (Pl. II, Figs. 17, 18.)

Male (apterous). Length about 1.5 mm. Color: legs and anterior half of body brownish yellow, posterior half brown. Head yellow, shaded brown on cheeks especially near eyes; antennae: IV to VIII brown, I to III brownish yellow, II distinctly paler than I and III; thorax and segments I and II of abdomen yellow shaded with brown, hypodermal pigmentation orange in weak light; legs concolorous with head and thorax; abdomen: segment III light brown in median third, brownish yellow at sides, segments IV to IX light brown, tube darker brown in basal half, paler brown in distal half. Spines yellowish, not conspicuous.

Head about 1.4 as long as wide, and nearly 1.2 as wide at base as across eyes; notched at sides behind eyes; not sculptured except for three or four transverse lines on produced vertex at insertion of antennae. Three pairs of capitate head bristles, as illustrated. Eyes bulging slightly, composed of rounded facets of varying sizes. Antennae 1.75 times as long as the head, shape of segments as illustrated; sense cones long and pointed: III, 1-1; IV, 2-2; V, 1-1; VI, 1-0; VII one on dorsum. Mouth cone broadly rounded, extending nearly across prosternum. Maxillary palpi large, segment one about 8μ long, two about 52μ long by 12μ wide, with a sharp spine about 20μ long at apex.

Prothorax about 0.58 as long as head and about 2.18 as wide as long. All usual spines present, all except coxals slightly larger than postoculars, but of same shape; coxals about half as long as other spines. Pronotum not sculptured. Mesonotum with one capitate spine subequal to prothoracic ones near lateral margin on each side; metanotum with four such spines of comparable size in a transverse row across the middle, the outer pair on lateral margins with an additional smaller spine in front of them. Legs unarmed, fore femora not strongly enlarged.

Abdomen moderately broad and heavy, its width about 1.5 that of head. Spines capitate, tergites III to VI each with three pairs, of which the angulars are subequal to the posterior angulars of prothorax, and the median pair about 1.5 as long; segments VII and VIII each with two pairs of strong bristles somewhat longer than those on segment VI; on

IX three dorsal pairs, the inner and outer slightly enlarged at tip, and 2.5 as long as prothoracic spines, the intermediate pair much weaker, pointed and about one-third as long as the inner pair; a ventral pair projecting laterally are as long as outer dorsals, but pointed. Tube short and heavy, about 0.6 as long as head, nearly twice as long as wide, and more than twice as wide at base as at apex; setae at apex about half as long as tube.

Measurements of holotype (male) in mm.:—Length 1.5 (slightly distended); head length 0.24, width across eyes 0.149, greatest width 0.173, postoculars 0.045; prothorax length 0.14, width 0.306; spines: posterior angulars 0.05, on coxae 0.025, on hind margin 0.058, mid-laterals 0.054, anterior angulars 0.05, on anterior margin 0.054; pterothorax length 0.207, width 0.269; abdomen length 0.96, width 0.38; tube length 0.145, tube setae 0.074, tube width at base 0.079, at apex 0.033; spines on ninth abdominal segment 0.116, on eighth 0.062.

Antenna length 0.42 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	33	50	58	70	58	50	45	29
width in μ	41	33	29	31	29	27	23	12

Female (apterous). Very similar to male in coloration and details of structure, and only slightly larger; inner and outer pair of spines on segment IX of abdomen less distinctly enlarged, almost pointed.

Measurements of allotype (female) in mm.:—Length 1.68; head length 0.244, width across eyes 0.173, greatest width 0.215; interocular spines 0.054, postoculars 0.054; prothorax length 0.153, width 0.34, spines: posterior angulars 0.058, on coxae 0.041, on hind margin 0.07, mid-laterals 0.058, anterior angulars 0.058, on anterior margin 0.066; pterothorax length 0.28, width 0.32; abdomen length 1.04, width 0.48, tube length 0.182, tube setae 0.095, tube width at base 0.091, at apex 0.037; spines on ninth abdominal segment 0.149, on eighth 0.083.

Antenna length 0.48 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	50	66	74	79	62	58	50	33
width in μ	45	37	33	33	29	29	25	12

Described from 9 mounted specimens, 6 ♂♂ and 3 ♀♀, taken in fallen leaves, as follows:—by Mr. S. J. S. Marais at Fauresmith, O. F. S., 4.v.1930 one ♂, one ♀; by the writer at Ottobotini on the Pongola river, Zululand, 17.ix.1922, one ♂, and at Silverton, Pretoria, 24.v.1922, 4 ♂♂ and 2 ♀♀.

This species is very closely related to *P. meridionalis* Priesner; it differs in having segments III to VI of the antennae each about 15–20 μ longer, and the spines on segment VIII of the abdomen more distinctly enlarged at the tip.

***Allothrips africanus* spec. nov.** (Pl. III, Figs. 19, 20.)

Female (apterous). Length about 1.1 mm. Color: general color light brown and brownish yellow, with reddish yellow hypodermal pigmentation visible in weak light. Head brownish yellow, shaded darker on genae and in front of eyes. Antennae: IV to VII light brown, IV slightly paler than V to VII; I light yellowish brown similar to IV, II and III yellow with brownish tinge. Thorax slightly darker than head, more distinctly light brown. Legs rather uniformly brownish yellow, similar to segments II and III of antennae, tarsi narrowly tipped with black on inner side. Abdomen: segments I to IX light brown, somewhat darker than thorax; tube: basal two-thirds yellow, distal third tinged with brown. Spines and setae on all parts of body pale, inconspicuous.

Head about 1.2 as long as wide, and about 1.9 as long as prothorax, slightly wider at base than across eyes, cheeks faintly rounded. Eyes small, each consisting of about five large rounded facets, protruding slightly in front. Ocelli absent. Postocular bristles about 50 μ in length, expanded at apex, situated very close to eyes; two bristles on the median dorsal area of the head are shorter than postoculars and variable in size and position. Interocular bristles about two-thirds as long as postoculars, close to front margin of eyes; a pair of short bristles are situated laterad of the eyes, close to their hind margins, and these bristles are sometimes duplicated.

Antennae about 1.5 as long as head, stout; bristles pale and inconspicuous, pointed, except two or three on the dorsal aspect of segments II and III which are expanded at the tip in some specimens; sense cones long and slender: III, 1–1; IV, 1–1; V, 1–1 (+1); VI, 1–0 (+1); VII one on dorsum near the middle. Segments V and VI produced ventrally at apex, to form a short conical projection which bears a seta at its tip.

Mouth cone broadly rounded, extending across prosternum. Maxillary palpi long and slender, bearing a strong, slightly curved spine at the tip of the second segment which is usually bent inwards; this appendage is so well developed that it gives the palpus a three-segmented appearance, and strongly suggests that the function is prehensile rather than tactile; the second segment about 48 μ long by 8 μ wide, the spine

about 20μ long and 4μ wide at base. Labial palpi well developed, also with a sharp long spine at the tip, but not curved inwards; segment two about 20μ in length, spine about 16μ . Labrum bluntly pointed.

Prothorax about 2.3 times as wide as long. All the usual spines present, expanded distally, subequal in length and about two-thirds as long as postoculars. The median pair of spines on the posterior margin are well developed in the genotype, but minute in *africanus*. Pterothorax short, and narrower than the prothorax across coxae. Legs rather short but not stout, fore femora not noticeably enlarged; legs not armed.

Abdomen broad and heavy, about 1.3 as wide as prothorax across coxae. All bristles pale and expanded distally, except two pointed lateral pairs on segment IX which extend almost to the tip of the tube; the bristles on segments I to VII subequal to postoculars, those on VIII about 1.5 as long. Tube shorter and heavy, slightly more than twice as wide as base as at apex, and about 1.5 times as long as width at base; sides slightly concave in outline; terminal setae pale, slender, about as long as the tube.

Measurements of holotype (female) in mm.:—Length 1.07; head length 0.226, width 0.192; prothorax length 0.121, width 0.276, spines at posterior angles 0.042; pterothorax width 0.24; abdomen width 0.370; tube length 0.117, width at base 0.079, at apex 0.033. Fore leg: femur length 0.128, width 0.056; tibia length 0.12, width 0.032; tarsus length 0.04, width 0.024.

Antenna length 0.33 mm.

segments	I	II	III	IV	V	VI	VII
length in μ	42	54	58	42	42	42	67
width in μ	40	36	36	36	32	28	28

Male (apterous). Smaller than female, but very similar in coloration and details of structure: ventral elongation of segments V and VI of antennae more pronounced than in female, and segment IV also produced somewhat. Fore femora enlarged, and fore tarsi armed with a stout tooth in some specimens; the tarsal tooth variable in size, and wanting in one specimen from Bloemfontein; its size is more or less correlated with the enlargement of the fore femur, as the following measurements show:—

width of fore femur, in μ	83	83	67	67	63	52	50
length of tarsal tooth, in μ	21	17	17	13	10	4	4

Measurements of allotype (male) in mm.:—Length 0.98; head length 0.192, width 0.16; prothorax length 0.104, width 0.226; spines: posterior angulars 0.029; pterothorax width

0.21; abdomen width 0.26, tube length 0.092, width at base 0.063, at apex 0.029. Fore leg: femur length 0.121, width 0.05; tibia length 0.1, width 0.036; tarsus length 0.04, width 0.024, tooth on tarsus length 0.004.

Antenna length 0.299 mm.

segments	I	II	III	IV	V	VI	VII
length in μ	33	42	50	38	38	38	54
width in μ	38	31	29	33	29	29	25

Described from 14 mounted females and 10 males taken by the writer amongst fallen leaves in dry situations on hillsides in the following localities: Pretoria; Bloemfontein; Rietspruit, Marico, Transvaal; Ottobotini, Zululand. January to September, 1920 to 1930.

This species differs from the genotype *A. megacephalus* Hood in the much paler coloration, the absence of strong bristles on the middle of the posterior margin of the prothorax, and the relatively longer head. From *A. caudatus* Bagnall it differs in the much smaller size and shorter tube.

• *Idiothrips* gen. nov.

Body sculptured, short and broad, depressed. Head large, heavy, as long as broad; postoculars wanting; eyes large, extending backwards beyond the middle of the dorsal aspect of the head, but very short ventrally. Antennae seven segmented, segments six and seven closely united. Mouth cone large, heavy, extending across prosternum, labrum pointed and extending beyond labium, both pairs of palpi long. Legs short, fore femora moderately enlarged in both sexes, fore tarsi of male with a long tooth, those of female unarmed. Body bristles short, feebly clavate, those at posterior angles of pronotum funnel-shaped. Tube about half as long as the head.

• Genotype *Idiothrips bellus* spec. nov.

This genus is related to *Stictothrips* Hood, but it can readily be distinguished by the seven segmented antennae, the unarmed fore tarsi of the female, the larger mouth cone and longer palpi.

Idiothrips bellus spec. nov. (Pl. III, Figs. 21, 22.)

Female (apterous). Length about 0.9 mm. Color: in reflected light dark red, white and black: Head black with reddish tinge at base; eyes dark red; antennae: segments I, II, IV, VI and VII blackish brown, III and V very pale, almost colorless. Prothorax dull opaque white with granulated appearance, a group of irregular red spots on each side, and

transparent margins at posterior angles. Pterothorax red with black tinge and white spots on anterior and posterior angles; legs blackish brown with pale bands at tibio-tarsal joints, each tibia being yellowish gray in distal fourth. Median part of abdominal segments I to VIII, the whole of IX and tube dark red, with blackish tinge; segments I to VIII with lateral white bands, similar to prothorax, about as wide as hind tibiae, bordered with a narrow transparent margin; a transverse whitish area in the middle of segment I, and a median row of transverse narrow whitish lines on the intersegmentalia caudad of segments II to VII.

In transmitted light the coloration appears entirely different: head brown, eyes black; antennae: III and V transparent, pale yellowish gray, the rest brown, somewhat paler than head; thorax and abdomen light brown with bright red hypodermal pigmentation; legs light brown with all tibiae pale gray in distal fourth. All bristles pale, transparent and difficult to see.

Head large, as wide as long, about 1.5 as long as prothorax and 1.8 as long as tube; dorsal surface incompletely but distinctly reticulated, vertex between eyes with longitudinal lines of sculpture, cheeks minutely serrate; postoculars absent; four irregular longitudinal rows of short, broad bristles as illustrated. Eyes large, with numerous rounded facets, and a number of minute punctures between them that are probably setigerous.

Antennae about 1.5 times as long as head, broad and heavy, seven segmented, shape of segments as illustrated. Many of the setae are shaped like sense cones, so that it becomes a matter of difficulty to identify the true sense cones; eight setae on segment II could readily be described as sense cones. There appear to be true sense cones as follows: III, 1-1; IV, 1-1 and one on ventral aspect; V, 1-1 and one on ventral aspect; VI, 1-1; VII, one on dorsal aspect.

Mouth cone extending across prosternum, labrum black, pointed, extending beyond labium; maxillary palpi about $48\ \mu$ in length, the distal segment about three times as long as the basal one (36 to $12\ \mu$); labial palpi about $32\ \mu$ long, the distal segment 24 and the basal one about $8\ \mu$.

Prothorax about 2.3 times as wide as long, hind angles projecting beyond the coxae; posterior angular spines funnel-shaped, very broad, about $25\ \mu$ in length; four rows of smaller broadened bristles on surface of pronotum, as illustrated; surface of pronotum practically without sculpturing. Pterothorax narrower than prothorax, dorsal surface with about 20 transverse lines of sculpture, each with minute pro-

tuberances; mesonotum with a group of three bristles similar to those on head on each side, metanotum with two groups of five such bristles. Legs short and moderately stout, each with a fringe of curved, broad bristles on outer margins of femora and tibiae, and two larger ones near apex of tibiae on outer side; in addition there are a number of scattered broad bristles on the upper and lower surfaces of the femora and tibiae.

Abdomen broad and heavy, nearly 1.2 as broad as the prothorax, segments II to VIII strongly transverse; segments III to VIII each bears a narrow transverse dark line about one-third the length of each tergite from its anterior margin, each line with four minute circular punctures, two near the mid-dorsal line and one near each lateral margin of the tergite; these lines produced on to the sternites in each case, extending about one-third the width of the sternites from their lateral margins. The tergites with some irregular fine sculpturing; the intersegmental membranes caudad of segments II to VIII prominently sculptured with about twelve transverse lines, of which the posterior 8 or 10 are broken up into minute rectangular blocks (only visible in stretched or macerated specimens).

Segments III to IX of abdomen each bear a broad scale-like bristle at each posterior angle, the bristles on III to VII obliquely truncate, and not as broad as the posterior angulars of the prothorax; the bristles on segment III about 24μ long, and those on VII about 28μ . The posterior angular bristles of segment VIII about 40μ long and 8μ broad at the tip, those on IX about 40 by 4μ . Setae at apex of tube weak, pointed, six in number, about half as long as tube.

Short, broad bristles similar to those on the head present on the abdominal tergites, about 10 in a transverse row near the middle of segments II to VIII, two on each side of the mid-dorsal line and three or four near the lateral margins; in addition these tergites each bear a single somewhat larger bristle near the posterior margin on each side about half-way between the mid-dorsal line and the lateral margin; on tergites VIII and IX there is also a mid-dorsal, posterior marginal pair of large bristles about half as broad and two-thirds as long as the posterior angulars of segment VIII.

Tube short and slender, about twice as long as wide, the width at base nearly twice that at apex, sides sloping rather regularly from base to apex.

Measurements of holotype (female) in mm.: Length 0.94; head length 0.19, width 0.19; prothorax length 0.124, width 0.286; bristles at posterior angles of prothorax 0.025; pterothorax length 0.124, width 0.26; abdomen length 0.52, width 0.33; tube length 0.103, width at base 0.052, at apex 0.029;

setae on tube 0.058, bristles on IX of abdomen 0.04, on VIII 0.04 long by 0.008 wide.

Antenna length 0.28 mm.

segments	I	II	III	IV	V	VI	VII
length in μ	17	45	41	45	41	58	33
width in μ	25	33	23	27	29	29	17

Male (apterous). Smaller and more slender than the female, but with the same coloration, except that practically the whole of the fore tarsus is as pale as the distal portion of the tibia. Fore tarsus with a long, slender, slightly curved brown tooth (about 24 by 4 μ) and an expanded transparent bristle of about the same length close to and immediately above it. Fore femur enlarged, about 128 μ long and 60 μ wide (in the female about 112 by 60 μ).

Measurements of allotype (male) in mm.:—Length 0.82; head length 0.153, width 0.149; prothorax length 0.12, width 0.23, postero-angular bristles 0.019; pterothorax length 0.107, width 0.2; abdomen length 0.44, width 0.22; tube length 0.074, width at base 0.041, at apex 0.025; setae on tube 0.036; bristles on 9th abdominal segment 0.033, on 8th 0.029.

Antenna length 0.27 mm.

segments	I	II	III	IV	V	VI	VII
length in μ	17	41	37	45	41	54	33
width in μ	21	29	21	21	25	29	17

Described from eight females and one male (mounted specimens) taken by the writer as follows:—on *Grewia cana* Sond. at Moorddrift, Transvaal, 20.iv.1924 (one ♀), and on *Rhynchosia* sp. at Warmbaths, Transvaal, 4.v.1930 (7 ♀♀ 1 ♂).

Fulgorothrips gen. nov.

Body elongated, not depressed. Head strongly produced in front of the eyes, the produced part about 0.3 as long as the total length of the head, and about half as wide as the width of the head across the eyes; vertex not elevated, the anterior ocellus situated about half way between anterior margin of eyes and cephalic margin of head. Eyes produced caudad on ventral aspect of the head, their ventral caudal margin about as far from the base of the head as their anterior margin is from the cephalic margin of the head. Mouth cone very short. Antennae eight segmented.

Prothorax small, less than half as long as the head, and about twice as wide as long. Legs long and slender, fore femora enlarged and fore tarsi armed with a tooth in both sexes; femora and tibiae unarmed. Tube about 0.6 as long as the head, and about three times as long as its width at base.

Genotype *Fulgorothrips priesneri* spec. nov.

The distinctive characters of this genus are the strongly produced head and the ventrally produced eyes. Several other genera have the eyes produced ventrally, e.g., *Ommatothrips* Hood, *Bolothrips* Priesner and *Aldrancothrips* Hood, but none of these have the head noticeably produced in front of the eyes. *Ophthalmothrips* Hood has ventrally produced eyes, and its head is slightly produced in front of the eyes, but it differs from the new genus in having the anterior ocellus situated on the conically produced vertex. The new genus shows certain resemblances to *Phoxothrips* Karny but differs from it in the presence of a tooth on the fore tarsus of the female.

Fulgorothrips priesneri spec. nov. (Pl. III, Figs. 23, 24)

Male (brachypterous). Length about 3.5 mm. Color: body and legs uniformly blackish brown; fore tibiae yellowish brown, fore tarsi (including tooth) brownish yellow; antennae: segments, I, II, VI, VII and VIII blackish brown, III yellow, faintly darker at apex, IV yellow in basal half, light brown in distal half, V yellow in basal third, distal two-thirds blackish brown. Eyes yellow, underlying tissue reddish.

Head strongly produced in front of eyes, the produced part about 0.3 as long as the total length of the head, and about 0.4 as long as the remaining part of the head; width of produced part at base about half that of width of head across eyes, slightly less at apex in some specimens. Cheeks subparallel, very slightly concave about the middle and with a slight enlargement near the base, surface smooth, with two or three weak spines. Occiput minutely transversely striate.

Eyes large, with numerous small facets, slightly protruding, strongly produced ventrally, the produced part tapering to a bluntly rounded point that extends (as measured from above) to a point about midway between the posterior ocelli and the caudal margin of the head. Ocelli small; the anterior one slightly further forward than midway between the anterior margin of the eyes and the tip of the head, and slightly further from the posterior pair than these are from one another. A pair of strong blunt bristles situated near a transverse line passing through the anterior ocellus, about 80 μ in length, and a pair of very weak bristles, about 28 μ long, close to margin of eyes behind the posterior ocelli (not figured). Postoculars about as long as the cephalic bristles, but more sharply pointed and weaker, situated a little less than half their length from the eyes. A few additional scattered short bristles on the head (not figured).

Antennae slightly more than 1.5 times as long as the head, shape and relative length of segments as illustrated. Setae pale, weak, inconspicuous. Sense cones smaller, slender: III, 1-1; IV, 2 (+1)-2; V, 1 (+1)-1 (+1); VI, 1-0 (+1); VII with one on dorsum. Mouth cone very short, broadly rounded, labrum blunt; maxillary palpi short, second segment about 28 μ long and 12 μ wide; labial palpi minute.

Prothorax about 0.47 as long as the head, and about 1.8 as wide across the coxae as its dorsal length; pronotum smooth, the usual bristles present: posterior angulars and coxals similar to cephalic pair on head, posterior marginals and midlaterals about half as strong, the latter situated more mesad than usual, anterior angulars smaller than midlaterals, anterior marginals minute.

Pterothorax elongate, nearly as long as the head, sides parallel. Rudimentary wings narrow, difficult to see, extending to anterior margin of first abdominal segment. Mesonotum with fine anastomosing lines of sculpture giving it a reticulated appearance.

Fore femora strongly enlarged, width about 0.36 to 0.4 of their length, the relative width being somewhat variable; fore tibiae with a short, seta-bearing projection near apex on inner side; fore tarsi with a strong tooth at base, tooth about 50 μ long and 16 μ wide. Middle and hind legs rather long and slender: hind femur length about 0.44 mm., width 0.088 mm.; tibia about 0.4 by 0.048 mm.

Abdomen long and slender, tapering more or less gradually from fifth segment to tube. Tergites finely sculptured with transverse striations: in anterior half these anastomose into incomplete reticulations, in the posterior half they are much closer together. Segments III to VIII each with a pair of blunt bristles near posterior angles of tergites, those on III about 80 μ in length, on IV and V somewhat longer, those on VI to VIII about 140 μ . Segment IX with three pairs of pointed bristles reaching nearly to the tip of the tube.

Tube about 0.7 as long as the head, and about 3 times as long as width at base, sides sloping evenly from base to apex; terminal setae about as long as tube, interspaced with fine curved setae about one-fourth their length.

Measurements of holotype (brachypterous male) in mm.:—Length 3.3 (slightly distended); head length: total 0.472, from base to anterior margin of eyes 0.336, thence to anterior margin 0.136; width across eyes 0.192, behind eyes 0.184, in front of eyes and at apex 0.104; prothorax length 0.216, width 0.344; posterior angular spines of prothorax 0.056, coxals 0.056; pterothorax length 0.36, width 0.344; abdomen length 2.34, width 0.4; tube length 0.28, width at

base 0.096, at apex 0.052; tube setae 0.32.

Antenna length 0.728 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	56	68	160	132	100	80	60	60
width in μ	40	40	36	36	32	32	24	16

Female (brachypterous). Length about 4.2 mm. Very similar to male in coloration, but fore tibiae somewhat darker, and segment IV of antenna paler, almost wholly yellow in some specimens. Fore femora not so strongly enlarged as in male, width equal to about one-third of the length; fore tarsi with a small tooth near apex, directed downwards (forwards in the mounted specimens), about 20 μ in length. Coxal spines shorter than posterior angulars of prothorax, these equal to cephalic pair on the head.

The macropterous female does not differ from the brachypterous form in structure or coloration. Wings delicate, colorless, slightly curved outwards, not noticeably narrowed in the middle; length of fore wing about 1.28 mm., width at base 0.12, at middle 0.12 mm.; fore wing with about 12-15 intercalated hairs in the fringe.

Measurements of *allotype* (brachypterous female) in mm.:—Length 3.5 (slightly distended); head length: total 0.52, from base to anterior margin of eyes 0.36, thence to anterior margin 0.16; width across eyes 0.232, behind eyes 0.216, in front of eyes 0.128, at apex 0.12; prothorax length 0.24, width 0.424, posterior angular spines 0.1, coxals 0.064; pterothorax length 0.48, width 0.432; abdomen length 2.4, width 0.64; tube length 0.4, width at base 0.12, at apex 0.06, tube setae 0.4.

Antenna length 0.77 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	60	80	188	148	116	92	68	68
width in μ	48	40	36	40	36	32	24	20

Described from 22 mounted specimens (10 brachypterous males, 9 brachypterous females and 3 macropterous females) taken in grass sweepings by the writer in Zululand at Ndumu and in the Ingwavuma district in September 1922, and in Portuguese East Africa at Chinanganine and Vila de João Belo [= Chai Chai] in July 1930.

I take great pleasure in dedicating this distinct and interesting new form to Professor Dr. H. Priesner of Cairo, Egypt.

Hoodiana gen. nov.

Body elongate, depressed. Body and legs rough on surface, bearing numerous minute warts, some of which bear

setae. Head about 1.5 times as long as wide, produced in front of the eyes, the produced part about one-sixth of the total length of the head; eyes prominent, bulging, moderately large. Cheeks closely set with small tubercles, some of which bear minute setae. Antennae consisting of eight segments, the third segment with a shelf-like ring near the base, the sixth only about half as long as the fifth and not much longer than the seventh which is as long as the eighth. Mouth cone short, broadly rounded, maxillary palpi two segmented, the first segment minute.

Prothorax transverse, bearing one blunt spine at each posterior angle. Legs short and stout, roughly sculptured like the cheeks; hind and middle coxae equally widely separated, both pairs closer together than the anterior coxae. Abdomen feebly sculptured at the sides, segments three to nine with one strong spine at each posterior angle; the ninth segment equal to the eighth in length; the tube about half as long as the head, the terminal setae less than half as long as the tube.

Genotype *Hoodiana pallida* spec. nov.

This form is placed in the family Urothripidae for the following reasons:—(1) its general appearance is strongly suggestive of the urothripids; (2) the sides of the body and the legs are roughly sculptured, bearing minute tubercles; (3) the mouth cone resembles the type found in the Urothripidae in the broad protruding labium and the minute basal joint of the maxillary palpus; (4) the prothoracic bristles are reduced to a single pair at the hind angles; (5) the third antennal segment is provided with a shelf-like ring at the base.

It differs from the other genera of the Urothripidae in the following characters:—(1) hind coxae as far apart as the middle coxae; (2) ninth segment of abdomen subequal to the eighth in length; (3) the terminal setae shorter than the tube; (4) the antennae are eight segmented.

It is therefore clear that *Hoodiana* is intermediate between the Phleothripidae and the Urothripidae, reducing still further the characters available for separating the urothripids from the other Tubulifera.

It is the writer's privilege to be able to name this curious new genus after Professor Dr. J. D. Hood of Rochester, New York.

***Hoodiana pallida* spec. nov.** (Pl. III, Figs. 25, 26.)

Female (apterous). Length about 1.5 mm. Color in reflected light lemon yellow with gray-brown spots on sides of

abdomen and some spots of bright red pigmentation in the thorax and first abdominal segment; eyes dark red; antennae: segments I to IV translucent, gray and yellowish, V to VIII dark brown; legs like basal part of antennae, shaded with brown.

In transmitted light the color is greyish yellow, shaded with brown. Head greyish yellow, shaded brown on posterior half of the genae; eyes black; antennae: I to IV yellow, V to VIII light brown, V darker than VI to VIII. Prothorax like the head, narrowly blackish brown on the anterior angles, with deep red hypodermal pigmentation near the anterior angles, the posterior angles lighter brown. Pterothorax similar to the prothorax, lateral shading not so dark, one spot of red hypodermal pigmentation at each anterior angle of the mesonotum. Legs pale gray, much less yellowish than the body, the basal half of each femur and tibia shaded light brown especially at the sides, the tarsi light brown. Abdomen with three spots of red hypodermal pigmentation in the first segment; the general color brownish yellow, due to brown shading which is especially well developed on the sides; the median dorsal area generally paler; tube grayish yellow.

Head about 1.6 as long as wide, widest across the eyes; width at base about 17μ less than across eyes; width at narrowest point behind eyes about 24μ less than across eyes, this point about 28μ from posterior margin of eyes; produced part of head about one-sixth as long as total length of head, and a little more than twice as wide as long, slightly constricted at the base, and expanded to receive the antennae. Cheeks narrowed behind the eyes, thence gently rounded to near the base, very slightly narrowed again at the extreme base. Cheeks with numerous small rounded wartlets, about half of which bear minute setae that are curved cephalad.

An irregularly curved ridge of sculpturing behind each eye; a dorsal longitudinal median area of the head incompletely reticulated from base of head to near eyes; greater part of dorsal surface of head smooth, with a few scattered minute setae.

Eyes prominent, bulging, their length nearly one-fourth of total length of head, their width about two-thirds of their length, and slightly more than half of their interval; facets rounded, of unequal size, about 20 in each eye. Ocelli absent. Ventral surface of head without sculpturing, except for the warts on the cheeks which extend slightly on to the ventral margin, and about five oblique fine ridges behind the eyes; a pair of prominent setae about 25μ in length on a line pass-

ing through the posterior margin of the eyes; two pairs of much shorter setae in front of them and closer to the eyes.

Antennae large and heavy, 1.5 times as long as the head; general facies suggestive of those of the Urothripidae, especially the pedicel and the cup-like apex of the second segment, and the shelf-like ring near the base of the pedicel of the third segment; the third segment with a strong emargination on the inner side near the middle. Sixth segment remarkably small, only about 1.3 as long as VII, and very little more than half as long as V. Sense cones: III, 1-1; IV, 1-1; V, 1-1; VI, 0 (+1)-0 (+1); VII one on dorsum; the cones on the third segment slender, very much like two setae on the same segment, those on IV and V more readily distinguished from setae.

Mouth cone broadly rounded, reaching to about the middle of the prosternum; labium extends about half the length of the mouth cone beyond the labrum, broadly rounded, four setae on its caudal margin about 25μ long, two shorter ones between these and the palpi, and one laterad of each palpus; labial palpi minute, only about 6μ in length; maxillary palpi: segment I about 4μ , segment II about 20μ in length.

Prothorax about half as long as the head, and about 0.6 as long as wide; pronotum sculptured with ridges and tubercles at sides from anterior angles to the suture, the sculptured areas narrow, extending mesad only as far as the lateral margins of the head; the rest of the pronotum smooth, with about six minute scattered setae; one prominent spine about 25μ in length at each hind angle, blunt, gradually widened from base to apex.

Meso- and metanotum free from sculpture but with a few scattered minute setae. Sides of metathorax bulging, rounded, sculptured with rounded wartlets that are smaller and further apart than those on the cheeks.

Legs short and stout, very similar to those of *Urothrips*, outer surfaces of femora and tibiae roughly sculptured with wartlets larger than those on the cheeks, some of them bearing setae. All femora about equally enlarged. Length and width of fore femora about $100:48\mu$, tibiae about $80:44\mu$; posterior femora about $100:48\mu$, tibiae about $92:36\mu$. Coxal intervals as follows:—

	anterior	middle	posterior
holotype ♀, in μ	116	76	76
paratype ♀	100	72	72
(treated with NaOH)			

Abdomen widest (228μ) at segment III, tapering gradually thence to segment VIII which is 136μ wide. Segments

II to VII subequal in length; VIII somewhat shorter, $87\ \mu$ long; IX subequal to VIII in length. Tube a little more than half as long as the head, its greatest width (near the middle) about 0.3 of its length. Segments III to VII sculptured on extreme lateral aspect only with 4-6 wart-like protuberances, some of which bear minute setae. Tergites only faintly sculptured: I with 6-8 incomplete reticles on mid-dorsal line; II to VIII with 3-4 oblique lines of sculpture on each side, about midway between mid-dorsal line and lateral margins, and with 10-12 minute setae not arranged in definite rows. Segments III-IX each with one strong, curved, bluntly pointed spine borne on a strong tubercle near each hind angle, those on VIII about $50\ \mu$ long, on VI, VII and IX about $40\ \mu$, on IV and V about $36\ \mu$, on segment III, $32\ \mu$; segment IX with a pair of lateral pointed spines about two-thirds as long as the dorsal pair, and a pair of weaker and shorter ventro-lateral setae. Segments IV to IX each with four very small setae near the hind margin of the sternites.

The tube is widest near the middle, gently narrowed from there to the base, and then wider again at the base; distinctly notched beyond the middle, tapering thence to the apex; setae at the apex of the tube about 0.4 as long as the tube, six only present, the dorsal pair distinctly longer than the two other pairs.

Measurements of holotype (female) in mm.:—Length 1.48 (slightly distended); head length 0.244, width across eyes 0.149, near base 0.132; prothorax length 0.124, width without coxae 0.19, spines at posterior angles 0.025; pterothorax length 0.161, width 0.202; abdomen width 0.228, segment VIII length 0.087, width 0.136, spines 0.05; segment IX length 0.074, width 0.083, spines 0.041; tube length 0.136, width at base 0.037, at middle 0.041, near apex 0.025; tube setae 0.058.

Antenna length 0.36 mm.

segments	I	II	III	IV	V	VI	VII	VIII
length in μ	33	62	74	62	62	33	25	25
width in μ	29	37	29	33	33	21	14	6

Described from two mounted females (one macerated in NaOH), taken by the writer in sweeping native vegetation (shrubs) at Hermanus, in the south-western Cape Province, on January 17th, 1923.

Urothrips minor spec. nov.

Female. Length 0.94 to 1.28 mm. Color: head brown, with bright red hypodermal pigmentation (extending into thorax

and abdomen also); eyes dark red; antennae: I and II very pale, almost colorless, II, IV and V pale yellow, VI and VII pale brownish yellow, VII somewhat darker than VI; prothorax and fore-legs brown like the head; mesonotum brown; metathorax yellow, shaded brown at sides; middle and hind legs yellow, shaded with brown; abdomen: ground color yellow, with bright red hypodermal pigmentation in spots; segments II to VIII light yellowish brown laterally, about one-fifth of the width of each tergite being brown on each side, and a dorsal median paler brown line about half as wide as the lateral brown stripes; segment IX yellow, narrowly shaded brown at sides; tube yellow, with a very short brown band at extreme tip.

Head about as long as wide: in the series before me the relative length and width are somewhat variable; the length is from 146 to 163 μ ; in some specimens the width is equal to the length, in others it is 4 to 11 μ less, and in the majority from 2 to 21 μ greater than the length. Cheeks subparallel, very slightly rounded. Vertex produced somewhat in front of eyes, raised and rounded, projecting over a large part of segment I of the antennae; the anterior margin somewhat variable, the vertex being more distinctly produced in the series from Pretoria and Ndumu, and less produced in the series from Hermanus, while the specimens from Lourenço Marques are more or less intermediate in this respect. Eyes nearly one-third as long as head, consisting of about 12 rounded facets, bulging slightly on antero-lateral margin of head. Cheeks and dorsal aspect of head behind eyes, from eyes to base of head, roughly sculptured, scabrous, densely covered with minute tubercles of unequal size, some of which bear small setae. Dorsal median area behind eyes, a little less than half the width of the head, differently sculptured, bearing 15-20 transverse, irregularly broken wavy thickenings with minute scattered punctures between them which probably bear minute setae. Sculpturing of vertex similar to that of dorsal median area, but the protuberances do not form distinctly transverse ridges. Ventral surface of head smooth, except narrow margin of cheeks on which tubercles are present as on dorsal aspect.

Antennae seven segmented; I cylindrical; II globose, with a short constricted stalk on which the large globose part is mounted asymmetrically; III vase-shaped, with a distinct ridge near the base of the pedicel; IV and V broadly joined to III and to one another, barrel-shaped; VI pedicellate; VII elongate-conical. Sense cones long and slender: III, 0-0; IV, 1-1; V, 1-1; VI, 1-0; VII one on dorsum.

Mouth cone short, broadly rounded, extending to near middle of prosternum; maxillary palpi about 24μ in length, labial about 8μ , basal segments of both pairs minute.

Prothorax about 0.6 as long as head, and about twice as wide as long; pronotum with a transverse trough-like depression in the middle, its length equal to about one-third that of the pronotum; sculpturing of pronotum similar to that of dorsal median surface of head; minute seta-bearing punctures scattered over surface, and a row of about 12 on posterior margin, but no strong bristles present. Mesonotum distinctly but incompletely reticulated, there being about 12 distinct reticles in the median third; this character somewhat variable, the series from Hermanus having the reticles more transverse than those from Pretoria and Ndumu.

Metanotum widened posteriorly, sides and posterior angles rounded, lateral margins explanate, projecting about 6μ beyond the pleurites, the surface sculptured with flattened nipple-like protuberances pointing backwards and bearing minute setae at their apices; the setae numerous, scattered and not arranged in definite rows.

Legs short and stout; anterior femora moderately enlarged (length about 96, width about 56μ), hind femora about 100μ long and 45μ wide; posterior coxae about as far apart as the anterior coxae, but distinctly more widely separated than the middle pair: the intervals are approximately, anterior 100-120, middle 80-92, and posterior 112-120 μ ; femora and tibiae with numerous minute setae borne on small tubercles.

Abdomen about 1.4 as wide as prothorax; tergites II to VIII each with two transverse rows of minute setae borne on tubercles, and reticulated in anterior half, the reticles with minute longitudinal striations, the lateral (brown) portions of these tergites sculptured more or less like metanotum; segments IV to VIII with one strong, pointed, slightly curved spine about 20μ in length at each hind angle, segment III with a similar spine about half as long. Segment IX about 1.2 as long as its width at base, and about 1.9 as wide at base as at apex, its surface reticulated, the minute setae not in rows. Tube short, about 0.7 as long as the head, and about four times as long as its width at base, slightly constricted at base and at apex, sides subparallel; setae at apex nearly four times as long as the tube.

Measurements of holotype (female) in mm.:—Length 1.119 (distended); head length 0.146, width 0.142; prothorax length 0.095, width 0.194; metathorax width 0.248; abdomen width 0.274, segment IX length 0.102, width at base 0.084, at apex 0.05; tube length 0.106, width 0.029, setae on tube 0.384.

Antenna length 0.197 mm.

segments	I	II	III	IV	V	VI	VII
length in μ	18	33	37	29	26	29	33
width in μ	22	33	29	29	22	18	11

Male. Length 0.7–0.9 mm. Smaller than the female, but very similar in coloration and structure: slightly more brownish on sides of abdomen, setae on tube somewhat longer.

Measurements of allotype (male) in mm.:—Length 0.88 (slightly distended); head length 0.144, width 0.148; prothorax length 0.1, width 0.192; metathorax width 0.212; abdomen width 0.228, segment IX length 0.108, width at base 0.088, at apex 0.06; tube length 0.1, width 0.032, setae on tube 0.44.

Antenna length 0.204 mm.

segments	I	II	III	IV	V	VI	VII
length in μ	16	32	36	28	28	28	36
width in μ	20	32	28	28	20	20	16

Described from 56 mounted specimens, 45 ♀♀ and 11 ♂♂, all apterous, taken by the writer as follows: (1) amongst fallen leaves in rather dry situations, especially on hillsides:—Pretoria June 1922: 7 ♀♀ (including holotype), 9.vii.1922, 1 ♀ 1 ♂, 19.iv.1925 2 ♀♀ 1 ♂; Derby, Transvaal 27.vii.1922 1 ♀; Rietspruit Marico, Transvaal 14–15.i.1930 10 ♀♀ 6 ♂♂; Lobatsi, Bechuanaland Protectorate 8.ii.1928 1 ♀; Hermanus, Cape Province, December 1922 11 ♀♀ 1 ♂; 8.i.1923 1 ♀ 2 ♂♂; Ndumu, Zululand 19.ix.1922 5 ♀♀; Lourenço Marques, Portuguese East Africa 13.vii.1930 4 ♀♀; (2) in a dead flower-head of *Protca* sp. on the ground, at Hermanus, Cape Province, 7.i.1923 2 ♀♀.

This species differs from the genotype *U. paradoxus* Bagnall in the shorter tube, and the sculpture of the median dorsal area of the head, which is reticulate in *paradoxus*. From *U. bagnalli* Trybom it differs in having segments VI and VII of the antennae subequal in length, and probably also in the sculpture of the head which Trybom described as being similar to that of *paradoxus*.

Urothrips paradoxus Bagnall

Of this species only three specimens have been recorded in the literature: two from East Africa by Bagnall in 1909 and one from Natal by Trybom in 1912. I have collected good series of specimens under fallen leaves in rather moist situations, especially under poplar trees on the banks of streams, at Silverton near Pretoria (1922), Rietspruit, Marico, Transvaal (1930), on the Drakensberg at Sekororo Location, Pietersburg, Transvaal

(1927), Hermanus, Cape (1922), and Kirstenbosch, near Cape Town (1929). Only females have been found. I am indebted to Dr. R. S. Bagnall for confirming the identification of this species.

It should be noted that the majority of my specimens differ from the measurements given by Trybom in that segments III to VII of the antennae are from 3 to 11 μ longer than those of the specimen measured by him.

Stephanothrips graminis spec. nov. (Pl. III, Fig. 27.)

Female (apterous). Length about 1.1 to 1.3 mm. Color: head, prothorax and fore legs brown; pterothorax, abdomen, middle and hind legs largely greyish yellow, with pale red hypodermal pigmentation. Antennae: I light brown, II and III pale yellowish gray, IV slightly darker, V brownish yellow. Prothorax with a pale yellowish transverse band across the hind margin, occupying about one-fourth of the dorsal length, and bordered with a transparent caudal margin. Anterior tarsi and base of femora paler, yellowish gray-brown. Sides of pterothorax margined with pale brown. Middle and hind legs grayish yellow, shaded brown on margins.

Abdomen from segments I to VIII with a light brown lateral margin dorsally on either side, each brown area about one-sixth the total width of the abdomen, and a third pale brown line less than half as wide as the lateral ones along the mid-dorsal line extending over segments II to IX; segment IX yellow, tinged with gray, and narrowly light brown at sides; tube greyish yellow, about one-twenty-fifth of its length at apex light brown.

Head large and heavy, about 1.2 as long as its width at base, widened posteriorly, the width at base about 1.1 the width at the apex; anterior margin broadly rounded, extending over the base of the antennae so as to cover the first segment completely. Cheeks and greater part of dorsal surface closely set with minute wartlets, some of which bear small setae; the wartlets more widely scattered behind and between the eyes, and absent from a slightly depressed mid-dorsal longitudinal stripe about as wide as an antenna; this median area from base of head to anterior margin of eyes sculptured with transverse irregular flattened ridges.

Crown spines four in number, distinctly truncate; the median pair capitate, curved inwards, and about twice as long as the outer pair; the outer pair very close to a line passing through the anterior margin of the eyes, the basal tubercles of the median pair projecting from the cephalic

margin of the vertex; the median pair distinctly less than half (about 0.36) as long as the greatest width of the head.

Eyes small, consisting of three large, irregularly rounded facets and a fourth smaller one situated nearest the outer crown spine.

Antennae very similar to those of the genotype, except that segment III is about 10μ longer (71–73 as against 62). Three long pointed sense cones on segment III, one on the inner surface and two on the outer surface. Mouth cone broadly rounded, extending to the middle of the prosternum. Maxillary palpi with the second segment about 32μ long and 4μ wide at base, bearing a sharp spine, about 8μ in length, at the apex; labial palpi minute, also bearing a spine at the apex of the second segment, the spine subequal in length to segment II. I have not found three setae on the maxillary palpus like those figured for *buffai* by Trybom.

Prothorax about half as long as the head, and about twice as wide as long. The spines at the posterior angles about 20μ long and 8μ wide at apex. Surface of pronotum roughly sculptured in anterior three-fourths with irregular raised areas and about 30 minute seta-bearing wartlets smaller than those on the head. Metathorax subequal in width to the prothorax, wider than the mesothorax; meso- and metanotum not sculptured but bearing minute setae not arranged in rows.

Legs short and rather stout, fore femora slightly more enlarged than those of the other legs; fore femora and tibiae with numerous seta-bearing wartlets and some sculpturing similar to that of pronotum on outer and lower surfaces; similar setae and sculpturing on the middle and hind legs, but much less conspicuous on these owing to the pale coloration.

Abdomen long and slender. Tergites I to IX with numerous minute setae borne on small tubercles, not arranged in definite rows. Spines at posterior angles of segments III to VIII subequal, about 20μ long and 4μ wide, not dilated at apex, truncate, transparent. Segment IX slightly more than twice as long as VIII, its length about 145 to 150μ , its width at base about 80–90 μ , and at apex about 48–50 μ . Tube long and slender, about 186–204 μ in length; gently widened from about middle to apex, width at apex about 33 μ , at base about 26 μ ; setae at apex 2 to 2.3 times as long as the tube.

Measurements of holotype (female) in mm.:—Length 1.05; head length 0.179, width at base 0.15, at apex 0.131; crown spines length: median 0.05, lateral 0.026; prothorax length 0.091, width 0.19, posterior angular spines 0.02; metathorax width 0.208; abdomen width 0.234, tube length 0.186, width

at base 0.026, at apex 0.033, tube setae 0.434; fore femur length 0.1, width 0.052; tibia length 0.08, width 0.04; tarsus length 0.032, width 0.02.

Antenna length 0.168 mm.

segments	I	II	III	IV	V
length in μ	18	29	70	26	33
width in μ	22	29	33	22	15

Described from 31 mounted females taken by the writer as follows:—26 in grass sweepings at Conjeni, on the White M'folosi River, Zululand, 12.ix.1922; 3 on grass in the Ingwavuma district, Zululand, 19.ix.1922; 2 on grass at Vila de João Belo [= Chai Chai] in Portuguese East Africa, 19.vii.1930.

This species is closely related to the genotype *S. buffai* Trybom, but differs from it in the following characters:—third antennal segment about 10 μ longer, tube about 25 to 30 μ shorter, crown spines distinctly knobbed (Trybom's figure of *buffai* shows these definitely pointed), head wider at base than at apex (this not due to flattening resulting from pressure of the cover glass), 4th and 5th segments of the antennae paler, brown longitudinal line present along mid-dorsal line of abdomen, spines on segments III and IV of the abdomen borne at the hind angles, not on the sides. The new species differs from *S. bradleyi* Hood in the pale coloration of the thorax and abdomen; it cannot be confused with *S. occidentalis* Hood and Williams because this species has six crown spines.

A LIST OF HOMOPTERA FROM ONTARIO

BY EVERETT C. LERCH, Staten Island, N. Y.

The following Homoptera collected by Mr. J. F. Brimley of Ontario were turned over to me by Mr. J. R. de la Torre-Bueno for determination. Mr. C. E. Olsen kindly determined the Cicadellidae for me, and Dr. W. D. Funkhouser helped with the Genus *Cyrtolobus*. I thank both these gentlemen and Mr. A. J. Mutchler of the American Museum of Natural History and Mr. Wm. T. Davis of the Staten Island Museum for their kindness in giving me access to the collections for comparison.

CERCOPIDAE

- 1546 *Aphrophora quadrinotata* Say.
Rainy River District, Ontario.
2 specimens, August.

MEMBRACIDAE

- 1576 *Ceresa taurina* Fitch.
Rainy River District, Ontario.
2 specimens, August.
- 1579 *Ceresa borealis* Fairm.
Rainy River District, Ontario.
1 specimen, August.
- 1580 *Ceresa basalis* Walker.
Malorwa, B. C.
1 specimen, 1923.
- 1621 *Glossonotus crataegi* Fitch.
2 specimens from Prince Edw. County, Ontario,
July, and 1 specimen from Rainy River District,
Ontario, August.
- *Heliria praealta* Fowler var. *rubidella* Ball.
Rainy River District, Ontario.
1 specimen, August.
- *Palonica pyramidata* Uhler.
Rainy River District, Ontario.
2 specimens, July.
- *Palonica tremulata* Ball.
Rainy River District, Ontario.
2 specimens, August.
- *Telamona tristis* Fitch var. *coryli* Fitch.
1 specimen from Prince Edward County, Ontario,

- July, and 1 specimen from Rainy River District,
Ontario, September.
- *Telamona unicolor* Fitch.
Prince Edward County, Ontario.
2 male specimens, July.
- *Telamona tiliae* Ball.
Rainy River District, Ontario.
3 specimens, July.
- *Telamona spreta* Goding.
Rainy River District, Ontario.
1 specimen, September.
- 1678 *Cyrtolobus van* Say.
Rainy River District, Ontario.
1 specimen, July.
- 1685 *Cyrtolobus griseus* Van Duzee.
Rainy River District, Ontario.
3 specimens, July.
- 1695 *Cyrtolobus (Xantholobus) muticus* Fabr.
Prince Edward County, Ontario.
1 specimen, June.
- 1734 *Campylenchia latipes* Say.
Medicine Hat, Alta.
1 specimen, July.

CICADELLIDAE

- 1778 *Idiocerus pallidus* Fitch?
Rainy River District, Ontario.
1 specimen, October.
- 1779 *Idiocerus suturalis* Fitch.
Rainy River District, Ontario.
2 specimens, August and September.
- 1781 *Idiocerus provancheri* Van Duzee.
Rainy River District, Ontario.
2 specimens, May.
- 1795 *Idiocerus lachrymalis* Fitch.
Rainy River District, Ontario.
1 specimen, September.
- 1817 *Macropsis canadensis* Van Duzee.
Rainy River District, Ontario.
2 specimens, August and September.

- 1824 *Oncopsis variabilis* Fitch.
Rainy River District, Ontario.
2 specimens, June and July.
- 1837 *Bythoscopus robustus* Uhler?
Medicine Hat, Alta.
1 specimen, May.
- 1847 *Oncometopia lateralis* Fabr.
Medicine Hat, Alta.
2 specimens, June.
- 1873 *Draeculacephala angulifera* Walker.
Rainy River District, Ontario.
1 specimen, October.
- 1923-6 *Gypona scalatina pectoralis* Spangle.
Rainy River District, Ontario.
2 specimens, June.
- 1996 *Scaphoideus immistus* Say.
Rainy River District, Ontario.
1 specimen, July.
- 2014 *Platymetopius acutus* Say.
Rainy River District, Ontario.
2 specimens, August.
- 2051 *Deltocephalus configuratus* Uhler.
Rainy River District, Ontario.
1 specimen, October.
- 2126 *Orietura gammaroides* Van Duzee.
Rainy River District, Ontario.
1 specimen, June.
- 2324 *Chlorotettix unicolor* Fitch.
Rainy River District, Ontario.
1 specimen, July.

In preparing this list I used Dr. E. D. Ball's recent "Monograph of the Tribe Telamonini" (in *Entomologica Americana*, vol. XII, No. 1) for arranging the group. This paper has been of the greatest assistance to me.

DR. W. J. HOLLAND

The Brooklyn Entomological Society records with deep sorrow the death of its Honorary Member, Dr. William Jacob Holland, Director Emeritus of the Carnegie Museum of Pittsburgh, Pa., who died on December 14, 1932, at the age of 84 years.

World famous for his work in zoology and paleontology, Dr. Holland also achieved high distinction for his work as author, artist, educator and clergyman. Rarely has there lived a man so versatile and so accomplished in so many fields.

Born in Bethany, Jamaica, B. W. I., on August 14, 1848, the son of Moravian missionaries from Salem, North Carolina, he graduated from the Theological Seminary of Bethlehem, Pa., and received his degrees of A.B. and A.M. from Amherst College. Honorary degrees were conferred on him by Washington and Jefferson, Amherst, Dickinson, Bethany, and St. Andrews Colleges, and by the University of New York and of Pittsburgh. He was made Officier de la Legion d'Honneur in 1908, and was the recipient of similar decorations from the Governments of Germany, Austria, Hungary, Spain, Belgium and Russia.

An authority on Museum administration, Dr. Holland was the founder and first President of the American Association of Museums and a member of all the leading entomological societies in this country and abroad, as well as of many other scientific societies. He served as naturalist of the United States Eclipse Expedition to Japan in 1887 and to West Africa in 1889. He also travelled widely in North, Central and South America, and in Europe and Asia.

His interests in entomology were concerned particularly with butterflies and moths, on which he wrote many important papers. His outstanding publications are "The Butterfly Book" and "The Moth Book," illustrating and dealing with practically every species of these insects known from North America. These books are to be found on the shelves of every student and collector of insects, and have done more in stimulating and popularizing an interest in these subjects than any other publication.

The Butterfly Book, first published in 1898 and followed by numerous editions, had a sale of over 60,000 copies. In 1931 Dr. Holland brought out a completely revised new edition. This will stand as a classic with all nature lovers for many years to come.

How sad that it was not granted the eminent author to revise and republish his equally essential "Moth Book." We know, that this was his last, cherished ambition.

GEORGE P. ENGELHARDT.

ON WISDOM

Wisdom may seem a curious thesis to elaborate in a journal devoted to pure factual knowledge. But in the management of enterprises, great and small, into which matters of policy enter, it is necessary to consider all elements of a problem and to seek for its solution long before it becomes imperatively necessary to find it.

It is well-known to our authors and readers that we have ungrudgingly published extensive papers and imposed no limit on the number of plates or illustrations to accompany articles. Here is where wisdom must come into play.

We need not dwell on the present abnormal conditions, except to mention that they are bringing with them a sharp decrease in our income. Accordingly, we must plan to make both ends meet in the interests not alone of our Society's finances but also in those of our faithful subscribers and of those authors who favor us with their contributions. To meet these conditions, the Publication Committee has adopted the much-advertised and discussed plan of making the budget keep within income. Hence, for this volume and until further notice, the following principles will be put into practice:

1. The number of pages of each number of the BULLETIN will be decreased.
2. Articles published will not exceed ten pages in length, except by special arrangement with the authors.
3. The number of plates per number will be limited to not more than two.
4. No article with more than one plate will be accepted, except by special arrangement with the author.

We trust that our readers and authors will understand that we are "in the fell clutch of circumstance"; and that it is with the utmost reluctance that we are taking these—we earnestly hope—temporary measures.

PROCEEDINGS OF THE SOCIETY

MEETING OF OCTOBER 13, 1932.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday, October 13, 1932, at 8.10 p. m.

President Davis in the chair and twelve other members present, *vis.*, Messrs. Burke, Eisenhardt, Engelhardt, Lacey, Lemmer, Moennich, Nicolay, Dr. Herbert Ruckes, Messrs. Schaeffer, Sheridan, Siepmann, and Wilford; also Mr. Stecher and two reporters.

The minutes of the previous meeting were read and approved. Mr. Engelhardt presented the report of the treasurer and reported briefly for the Publication Committee.

Mr. Moennich, of the Outing Committee, reported that a field trip had been made on May 4th to Alley Pond Park, Long Island, attended by Messrs. Cleff and Siepmann and himself. Excellent weather and good collecting made the trip an enjoyable one.

The secretary read a letter from Dr. Bequaert, proposing for membership, Mr. Carlos Guillermo Aguayo, Avenida Wilson No. 17, Vedado, Havana, Cuba, the proposal being held over for action at the next meeting in regular course.

Mr. Moennich reported obtaining *Serica similis* at Little Neck, Long Island, representing an additional record for this recently introduced species. The determination was verified by Mr. Schaeffer.

Mr. Schaeffer also spoke of a dense swarm of the ladybird beetle, *Coccinella transversoguttata* variety *quinquenotata*, which is said to have been observed for a few days during the past July at Mattituck, Long Island. He believed that the beetles had been blown over from Connecticut.

Mr. Nicolay reported that he had spent a short time in the Great Smoky Mountains, near Elkmont, Tennessee, collecting on Mt. Leconte, Mt. Guyot and Clingman's Dome. He advised collecting on as many peaks as possible, rather than on only a single peak, since although the fauna may be similar on any of a number of near-by mountains, species will always occur on the summit of one which are either rare or entirely absent on the others. The best collecting was on the very tops of the mountains, *Cychnus* being usually found there, though a few could sometimes be taken a little lower down. Mr. Nicolay also reported collecting in the vicinity of Greenwood Lake, and at Jamesburg,

N. J. The objective of the latter trip was to obtain *Cicindela lepida* which had been recorded from that locality in the New Jersey State List. A search for this beetle in the few scattered sandy regions around Jamesburg appeared to be a futile one, and it was not until several hours' search that the beetle was finally located in the third of three adjoining sand-pits about two miles out of town. A fine series was obtained. He mentioned this as an instance of how local a species may be in distribution.

Mr. Moennich reported that he had made a trip to the Green Mountains of Vermont, hiking from Bennington to Camel's Hump. Mr. Lacey reported that he had obtained several species of insects not previously represented in his collection, which he would exhibit at a later date.

Mr. Lemmer exhibited a specimen of a male *Epipsilia heinrichi* Barnes and Benjamin, of which species only one other specimen, a female, is known.

Mr. Schaeffer recorded the capture by Mr. Lacey of *Ditoma crenata*, an introduced European Colydid beetle, at Pelham, New York. About forty specimens were taken. The only other American record for this species is that by Kenneth Cooper, at Flushing, Long Island, previously recorded in the Minutes.

Mr. Stecher reported that he had done some collecting in Massachusetts during the past summer, and would exhibit specimens later.

Dr. Ruckes reported that he had spent some time collecting in New Mexico, covering a large part of the state, and collecting in various orders, but chiefly in Hemiptera. He commented upon the distribution of species, and mentioned that there seemed to be no plausible explanation of different faunal regions in the east and west, whereas a difference between the northern and southern species could be explained by a change in climate and temperature.

Mr. Davis exhibited 87 pupal skins of *Tibicen chloromera* taken on and about the trunk of a single willow tree, commenting that this species may occasionally be so numerous as almost to compare with the seventeen-year locust.

The meeting adjourned at 10.10 p. m.

CARL GEO. SIEPMANN, *Secretary*.

MEETING OF NOVEMBER 10, 1932.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday, November 10, 1932, at 8.00 p. m. President Davis in the chair and nine other mem-

bers present, *viz.*, Messrs. Ballou, Engelhardt, Lacey, Lemmer, Moennich, Nicolay, Schaeffer, Siepmann, and Torre-Bueno. Five visitors were present: Miss Elizabeth Sherman, Messrs. Herman Finkelstein, John D. Sherman, Jr., Charles Ragot, and Hans Stecher.

Messrs. Torre-Bueno and Engelhardt reported at length for the Publication Committee. They said that the remaining stock of the GLOSSARY had been sold. Since this publication has always been a valuable asset of the society, they recommended that the society at this time take steps toward publishing a new and revised edition of this work. Mr. Ballou moved that the Publication Committee be authorized to compile a new glossary, and that the society expend the sufficient funds to cover the immediate expenses. The motion was regularly seconded and carried.

The election of Mr. Carlos Guillermo Aguayo, who was proposed for membership at the October meeting, was considered. The proposal was duly seconded, and the secretary was directed to cast one ballot for the election of Mr. Aguayo, who was accordingly elected.

Mr. Schaeffer said that the single record of *Adalia frigida* var. *humeralis* (Coleoptera, Coccinellidae) in the New York State List is a misdetermination. The record should be changed to *Adalia bipunctata* variety *quadrimaculata*. He stated that Mr. Lacey had recently taken the species in Westchester County, New York, thus providing an additional record for this form.

Mr. Lacey exhibited a box of insects, mostly Coleoptera collected by himself in Westchester County, during the past season, which were new to his collection. Among the species were *Elatér sayi*, *Glischrochilus obtusus*, *Omosita discoidea*, *Melasis pectinicornis*, and *Cyrtinus pygmaeus*.

Mr. William T. Davis showed about one hundred pupae skins and a few adult 17-Year Cicadas belonging to Brood VI. This brood occurs from Wisconsin to northern Georgia, and as far as known has a greater distribution than any other brood. On Staten Island the Cicadas were few in number in 1932, but occurred in most of the wooded areas, where they were about as numerous as in 1881, 1898, and 1915. Mr. Davis showed specimens collected on the Island in all of these years. In New Jersey, Mr. Carl G. Siepmann had collected in April some mature pupae under stones, etc. near Rahway; Mr. Frederick M. Schott had found a small colony near the pumping station at Charlotteburg,

Passaic County, and collected 9 adults, June 6, 1932, while Mr. George B. Wilmoth had found a number of pupae skins at Kaaterskill, Greene County, N. Y., July 15, 1932.

Mr. Engelhardt reported on the Fifth International Congress of Entomology held in Paris, July 16-23, 1932, which he attended as a delegate from the Brooklyn Entomological Society and the Brooklyn Museum of Arts and Sciences.

Headquarters were at the Institute National Agronomique, 16 Rue Claude-Bernard. The attendance of 400 or more included delegates from every leading country and about 40 from the United States of America.

The Congress was opened by a reception in the Grand Amphitheatre of the National Museum of Natural History, Rue Cuvier, in celebration of the 100th anniversary of the Entomological Society of France in the presence of M. A. Lebrun, President of the Republic of France, and M. A. de Monzie, Minister of National Education and Honorary President of the Congress.

The scientific morning and afternoon sessions, introduced by the President of the Congress, Dr. P. Marchal, comprised many important papers in French, English, German, Italian and Spanish, covering the various fields in entomology.

For the entertainment of the visiting delegates an elaborate programme had been prepared. Tea, served every afternoon in the garden of the Institute Agronomique, gave opportunities for informal gatherings and for getting acquainted with entomologists known heretofore through correspondence or through reputation alone. Indeed, it was a great pleasure to meet again our Honorary Member, Dr. L. O. Howard, now residing in Paris, Dr. K. Jordan, Dr. W. Horn and many others, who took so active a part at the International Congress in Ithaca in 1928. Banquets at the Claridge, at the Jardin de Vincennes and a reception at the Hotel de Ville will be remembered as splendid affairs. Then there were especially conducted parties for seeing the unrivalled art treasures, the magnificent boulevards and parks, the historic sections and buildings, institutions of education—in fact, everything pertaining to Paris, by day and by night. Very popular were the excursions by auto coaches to the grave of Latreille, the chateaus and forests of Chantilly and Fontainebleau and to Versailles, where those inclined could also indulge in collecting.

A final grand excursion followed the closing of the Congress on July 23. The fifty members registered for this excursion divided into two parties, one composed of representatives from

Europe and the other all Americans. A carefully selected, comprehensive itinerary, including reservations on railroads, auto cars, hotels and sight-seeing privileges afforded unusual opportunities for first hand observations in a land little affected by the progress of time, where the people still adhere to customs and traditions handed down through centuries.

Travelling from Paris by way of Bordeaux the first stop was made at Lourdes, the gateway to the Pyrenees, where thousands of pilgrims had gathered at the famous shrine. Here autos were waiting to conduct the party on a four day tour over good roads through the mountains.

Ascending steadily through open valleys and ancient settlements, narrow gorges cut by turbulent streams, along steep, wooded, but never heavily timbered slopes to Alpine meadows, were daily experiences. These meadows with their profusion of gaily colored flowers afforded excellent insect collecting. But above all they formed a setting for a glorious panorama of stark, sharply serrated peaks, silhouetted against snowfields and glaciers over a sea of billowing clouds.

Leaving the Pyrenees at Bagnères de Luchon the route proceeded through semi-arid country with limestone escarpments, vineyards and groves of olives to the old towns of Foix Mirepoix and Carcassonne, the latter noted as one of the best preserved double-walled medieval strongholds. Side trips were made from Foix to view the amazing paintings of prehistoric man in the Cave l'Herm and from Avignon to the Roman amphitheatre and beautiful arch at Orange and the near-by home and grave of Fabre, the famous French naturalist.

While the European party returned from here to Paris, the Americans continued by way of Montpellier on the Mediterranean to Chamonix, terminating their official excursion at the base of massive, snow covered Mont Blanc. Their subsequent and previous travels in Europe will be subjects for discussion at future meetings.

Mr. Engelhardt accompanied his remarks with numerous photographs of the regions visited and he exhibited his collections made on the trip.

The meeting adjourned at 10.25 p. m.

CARL GEO. SIEPMANN, *Secretary*.

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JUNE, 1933

No. 3

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CARL GEO. SIEPMAN

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DRAGONFLIES OF THE GENUS *TETRAGONEURIA*.

BY WM. T. DAVIS, Staten Island, N. Y.

An attempt has been made in this paper to separate the dragonflies of the genus *Tetragoneuria* (Hagen, Neuroptera, North America, p. 140, 1861) that the writer has been able to examine. In the "Handbook of the Dragonflies of North America" by Needham and Heywood, is the statement that "The species are all about one size and one color pattern of body and are very variable in the markings of brown upon the wings. Many species have been named because of very slight differences. We can find no good use for all these names since our specimens seem to transgress all the boundaries that have been indicated. The last important paper on the genus is that of Muttkowski (1911) [and 1915] in which he endeavors to define eleven species. We recognize five, that are separable . . ." p. 179.

In the present paper we have recognized thirteen named forms as species, subspecies and one variety. There are no doubt several more that might have been separated. No specimens of *costalis* Selys have been available and it has not been included in the table, but is added at the end of the paper. *Calverti* has been identified from the description only.

The "Studies in *Tetragoneuria*" (1911 and 1915) by Richard A. Muttkowski, Bulletin of the Wisconsin Natural History Society has been the chief source of reference, but the writings of Dr. Philip P. Calvert, R. Heber Howe, Jr., C. H. Kennedy and Edward B. Williamson, have been consulted together with other literature cited under the specific names. I am particularly indebted to Mr. E. B. Williamson for the privilege of examining numerous specimens from which some of the photographs have been made rather than from material in my own collection. Other acknowledgements are included under the specific names.

The figures of abdominal appendages have been drawn by Mr. Hans L. Stecher from a number of sources; from the insects, and

also from the published figures of the types, etc. In separating the species of *Tetragoneuria* the shape of these appendages is of prime importance, but whether the insect has a broad or a slim abdomen is also a character of much value. In order to arrive at a more accurate knowledge of *Tetragoneuria* it will be advisable in the future to collect many hundred specimens from as many localities as possible, and prepare or spread them so that they may be viewed in a comprehensive manner. Specific differences with such material often become apparent.

TETRAGONEURIA HAGEN, 1861

A Superior appendage of the male not declined at tip and without superior ante-apical spine or tubercle.

B Male superior appendages with ventral angle at basal third.

C Male superior appendages, when viewed from above, curved, and with the apical third bent outward.

D Abdomen of male rather broad, often much flattened.

E When viewed in profile the top and bottom lines of the male appendages beyond the ventral angle are not as parallel as in *semiaquea*, and the rounded extremity is more gradually attained. Length of abdomen about 30 mm., hind wing about 30 mm. male appendages about 3 mm., female appendages about 1.5 mm., vulvars flattened, divaricate, the tips divergent. Thoracic pile often conspicuously gray.

Brown of hind wing reaching the base of the triangle or less. Maine and Minnesota to Oklahoma and North Carolina. Type loc. Mass.

cynosura Say.

Brown of hind wing filling first to third antecubitals and thence diagonally across wing to lower end of membranula; transparent area between radius and cubitus small or wanting. New York, New Hampshire, New Jersey, Georgia, Iowa. Type loc. Bluffton, Ind.

cynosura sub. species *simulans* Mutt.

EE When viewed in profile the top and bottom lines of the male appendages beyond the ventral angle are more parallel than in *cynosura* and the rounded extremity is more suddenly attained. Smaller; length of abdomen about 25 mm., hind wing about 26 mm. Thoracic pile browner than in *cynosura*.

Brown of hind wing filling antecubital spaces to nodus, or at least the first four antecubitals, and thence diagonally across wing to lower end of membranula. Usually the transparent area between radius and cubitus at base of wing, not conspicuous. Coast from New England? to North Carolina and Georgia (type loc.).

semiaquea Burmeister

Brown of hind wing not reaching the nodus. Type loc. Georgia.

semiaquea subspecies *calverti*

Muttkowski

DD Abdomen rounder and proportionally more slender in comparison with *cynosura* and *semiaquea*; sides of abdomen nearly parallel.

Wings without brown markings; stigma paler and longer than in *cynosura*; ventral angle at basal third of superior appendage more obtuse than in *cynosura*. Length of abdomen, male 33-34 mm., female 33-34 mm.; of hind wing, male 30-31 mm.; female, 31. Female appendages 2 mm. West Palm Beach, Fla. (type loc.), Georgia, Louisiana *stella* Williamson

Both fore and hind "wings with brown spots at antenodal intersections, sometimes with spaces filled." Length of abdomen, male 28-31 mm., female 31 mm.; hind wing, male 27-31 mm., female 30 mm. "Male appendages intermediate between *cynosura* and *stella*, though more nearly related to the latter." "The female appendages are longer [about 2 mm.] than those of *cynosura* and ~~less~~ spiculiform. Vulvars slender and recurved, not flattened and divaricate as in *cynosura*, the tips sub-

parallel." Round Mountain, Blanco Co., Tex. (type loc.). Cypress Mill, Texas, Kansas, and Florida. (*costalis*?)

petechialis Muttkowski

- CC Male superior appendages when viewed from above more straight and with tips not bent outward; the inferior angle produced.

Abdomen of male slender, 29–31 mm., segments 2 and 3 inflated, 3 constricted at middle; fore wings without color; hind wings 31 mm.; male appendages 3.5 mm.; female appendages 2 mm. Wister, Oklahoma (type loc.).

williamsoni Mutt.

Abdomen 30 to 34 mm.; hind wing 30–33 mm.; female appendages 3–3.3 mm. Male appendages seen in profile somewhat like those of *cynosura*, but with a longer, slightly produced angle. The vulvars of the female are "like those of *spinigera*. Appendages somewhat stouter and longer." Resembles *cynosura* but the produced angle on the male appendages appears to effectually separate them. Solon Springs, Douglas Co., Wisconsin (type loc.), Michigan, Maine and Massachusetts.

morio Muttkowski

- BB Male superior appendages with ventral spine at basal third; no ventral angle.

T-spot of head present. Color on hind wing usually confined to first antecubital space (often to its posterior part) and narrowly along margin of membranula. Length of abdomen 30–34 mm.; hind wing 30 to 33 mm. Female appendages about 3.5 mm.; vulvars with the tip parallel. Maine, New York, Indiana, Wisconsin, Washington, "Canada" (type loc.) *spinigera* Selys

Color on hind wings usually filling first two or three antecubital spaces, extending thence obliquely across the wings to lower extremities of the membranule. Female can be told from *cynosura* var. *simulans*, which it resembles, by its longer appendages and usually larger size. Hudson Highlands, N. Y. ♂ and Newfoundland, N. J. ♀, allotype and type localities *spinigera* var. *suffusa* Davis, new variety

- AA Superior appendages of the male slightly declined at the tips beyond a superior ante-apical spine or tubercle.

Male superior appendage when seen in profile with a dorsal ante-apical sharp spine; apex of appendage blunt; ventral surface with angle at basal third; no ventral spine or tubercle. Female appendages 2 mm. in length; vulvars with the tips parallel. Hind wings usually with four antenodal cross veins. Georgia (type loc.), New Jersey *spinosa* Hagen

Male superior appendages when seen in profile with dorsal ante-apical elevation or tubercle; apex of appendage obliquely truncate; ventral surface with tubercle near basal portion. Male superior appendages 3 mm. Female appendages 2.3–2.7 mm.; vulvars with the tips parallel. Hind wings usually with five antenodal cross veins. Maine, New York, Wisconsin, Ontario, California, Washington (type locality). . . *canis* Mac Lachlan

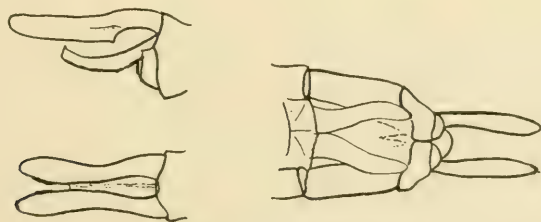
Tetragoneuria cynosura (Say) Selys., Pl. IX, fig. 1.

Jn. Acad. Philadelphia 8, p. 30, 1839.

Syn. *lateralis* Burmeister Handb. Ent. 2, p. 847, 1849.

Syn. ? *basiguttata* Selys., Bull. Acad. Belg. (2) 31, p. 271. 1871.

The original description contains the statement: "anal processes longer than the caudal and ultimate segment of the abdomen together a little dilated and curved outwards towards the tip, which is rounded, abruptly narrowed beneath towards the base; inferior process two-thirds the length of the superior ones." The anterior wings are described as immaculate, and the "posterior pair with the basal, costal, and subcostal cellules fuscous, and an irregular fuscous spot between them and the anal angle." These features, together with the given habitat "Massachusetts," fixes the identity of the species, which with *semiaquea* Burm., was described in 1839.



T. CYNOSURA, SAY

Burmeister's *Epophthalmia lateralis* is described very briefly, the male type coming from Philadelphia ("female not seen by

me"). As he states that the male cerci are elongate, clavate and curved outwardly, there can be no reasonable doubt but what *lateralis* is a synonym of *cynosura*.

Cordulia basiguttata was described as a race ? of *cynosura* by de Selys. "Abdomen, male 25; female 29. Hind wing, male 26; female 30. Shape more slender; abdomen almost cylindrical, not depressed, narrower behind the constriction. Coloration of the body darker, as are also the legs and the anal appendages; the blackish band of the base of the front extending over almost the entire upper side of the front in the emargination. The basal droplet [spot] of the hind wings shorter, but black in both sexes. The spot of the same color, placed close to the membranula, short in the male, absent in the female. Country: The male from Florida (Col. Selys), the female from Canton near Boston, N. B. The *Cordulia cynosura* and *semiaquea* seem to be so variable that I have not dared regard this race as a distinct species, the more so since it is not quite certain that the male belongs to the female with which I place it. The age of the specimens and their mode of preparation may also contribute to give the abdomen an appearance more or less compressed or depressed."

In his notes on synonymy (1915) Muttkowski states that: "The reference of this form to *cynosura* is based on Dr. Ris' notes," and adds that the female from Canton near Boston is "without doubt a true *cynosura*, while the male from 'Floride' may belong to some other species, probably *stella*." However, *stella* is usually larger than the measurements given in the above description for the male and it is also generally of a lighter color. We think that the male may prove to be the same as *williamsoni* which is smaller, has a slender, cylindrical abdomen and wing maculation as described.

The writer has several times seen members of this widely distributed species in great numbers, notably in Northern New Jersey in Passaic County near Buckabear and Cedar Ponds, and also along the shore of Conesus Lake, Livingston County, N. Y. On May 28, 1910, there was a remarkable gathering of this species along the road leading from Newfoundland, N. J., to Cedar Pond and the air was full of these dragonflies. On one small dead bush I counted twenty-two individuals, and there were other bushes and stems of plants that also had a great many resting upon them. On June 23, 1916, on the shore of Conesus Lake, Dr. Harry H. Knight captured thirty-one individuals by simply swinging his net about a bush where the dragonflies had settled, many of them being still quite immature. Twenty speci-

mens of this series are in the writer's collection. Six of them are typical *cynosura* with the hind wings slightly infuscated at the base, while fourteen belong to the subspecies *simulans* Muttowski, in which the hind wings are more heavily infuscated at the base, the darkened portion including the first two or three antecubital spaces and extending thence diagonally across the wings to the end of the membranule. There were no intermediates.

On Staten Island and about New York City generally, only typical *cynosura* has been collected. Mr. Williamson has noted on the envelope containing two typical male *cynosura* collected at Viberg Lake, Allen Co., Indiana, June 11, 1916: "Eight *simulans* and four *cynosura* taken today; no intermediates."

In the sixty specimens of *cynosura* and *simulans* in the writer's collection there are no intermediates, nor did I find any in the extensive series from Massachusetts, Connecticut and Vermont, kindly sent for examination by the late Mr. R. Heber Howe, Jr.

Tetragoneuria cynosura subspecies *simulans* Mutt., Pl. IX, fig. 2.

Bull. Wis. Nat. Hist. Soc. (2) vol. 9, pp. 95, 106, 1911.

diffinis Selys, Bull. Acad. Belg. (2) 31, p. 272, 1871;
simulans syn. of *diffinis*?

In the original description *simulans* is distinguished by having "Hind wings with markings reaching to tip of triangle and beyond," instead of, "Hind wings with markings reaching the base of the triangle or less," as in typical *cynosura*.

Muttowski (1911) uses the trinomial name, "*Tetragoneuria cynosura simulans*," for this insect, but as both forms occur together over a part of their range, especially inland, *simulans* is probably not a geographic race of *cynosura*, and I think should be designated as a subspecies unless it can be shown in the future to be distinct.

This insect has been frequently identified as the *semiaquea* of Burmeister (1839), described from Savannah, Georgia, as, for instance, when de Selys (1871) states that he has that species from "Ga., S. C., Washington, Fla., Mass." *Simulans* is larger than *semiaquea* from the southeastern Atlantic States, and the hind wings are not as broadly marked with brown at the base.

In 1871 de Selys states: "I believe that my *diffinis* described from an example in the British Museum labelled Nova Scotia, is nothing but an individual variety of *semiaquea*. It differs only because the discoidal triangle of the upper wings is free. M. Hagen has communicated an example from Massachusetts showing the same aberration."

As mentioned above the circumstance of the discoidal triangle being free is not of very much importance, but *diffinis* must have had the basal part of the hind wings browned or it would not have been considered with *semiaqua*, and as the type came from Nova Scotia, it is likely to have been what is here considered *simulans* Muttkowski (1911), and not *semiaqua* at all. In the second part of his "Studies in Tetragoneuria," (1915), Muttkowski lists *diffinis* as a synonym of *simulans* and adds "insufficient diagnosis." He also states: "This form has hitherto not been noted in the synonymy. Its characterization although vague when taken together with de Selys' synonymical notes is sufficiently distinct to merit attention."

As has been stated under *cynosura* this species or subspecies has not been found on Staten Island, but a few miles to the north, at Ramsey, Hewitt and Newfoundland, New Jersey, and Ramapo, Greenwood Lake, and Pine Island, New York, it occurs with typical *cynosura*. At Conesus Lake, New York, on June 23, 1916, *simulans* exceeded typical *cynosura* in numbers. Though closely associated, I found no intermediates.

Tetragoneuria semiaqua (Burmeister), Pl. IX, fig. 3.

Handb. Ent., 2, p. 858, 1839; ♀ (*Libellula*).

Syn. *complanata* (Rambur), Ins. Neur., p. 145, 1842; .
(*Cordulia*), ♀ ♂, Coll. Selys.

The original description calls for an insect with the segments of the abdomen as broad as long or still broader, the entire abdomen flat, always broader than thick, narrowed posteriorly. When seen in profile not strikingly thicker at the base but becoming gradually thinner outwardly from the base. "Wings hyaline the hind ones broadly fuscous, with a transparent spot and some of the veins infusate; abdomen with fulvous lateral spots. Long 1" 3'" ♀." The type came from Savannah, Georgia.

In 1842 Rambur described his *complanata* from "North America" as having the "Wings transparent, the hind ones a little widened, with a broad, brown-rufus reticulate spot which sometimes covers almost half the wing in the female but which in the male sometimes disappears entirely." His description may embrace what are now considered several different species of *Tetragoneuria*, but the "brown-rufus, reticulate spot which sometimes covers almost half the wing," can we think, refer only to what is here considered typical *semiaqua*.

In 1871, de Selys stated that *semiaqua* is so near to *cynosura*

that a comparison therewith will enable an understanding of the differences better than a regular description. He states that he has it from Ga., S. C., Washington, Fla., and Mass. From his localities and comparative description it is possible that he included *simulans* and *calverti*.

In 1911 Muttkowski stated: "This species hitherto known as *complanata* Rambur and as representing the extreme of the *cynosura-semiaquea-complanata* series, I regard as distinct. It is essentially an Atlantic coast species covering the region from Massachusetts to Georgia [Massachusetts records are doubtful].

"Its main distinction from *cynosura* and *simulans* is the smaller size and the wing markings, though some minor points exist such as the largely brown pile of the thorax-grayish-white in *cynosura*—and the more marked tubercle on the superior appendix of the male.

"Head, thorax and abdomen of typical coloration. T-spot absent, never more than the stem visible in black. Thorax with pile largely brown, so that it is little apparent. The lateral stripes occasionally with a metallic glint."

In 1915, Muttkowski states, referring to *cynosura*, *simulans* and *semiaquea*: "The synonymy of some of the forms is undoubtedly somewhat involved owing to the peculiar nomenclatural interchange in early descriptions, which have been variously followed by authors . . . All of the material of de Selys under *T. complanata* reverts to *T. semiaquea*; that under *T. semiaquea*, as stated above, is insufficiently diagnosed to permit accurate determination. It should be noted that it presents certain peculiarities especially exhibited by specimens from Massachusetts, which should make a detailed study of a long series from Massachusetts of decided interest."

In *Psyche* for March, 1895, Prof. Albert P. Morse, commenting upon *Tetragoneuria cynosura* and its varieties as found in Massachusetts, states: "There is another species found in the Southern States, having the fuscous of a more reddish hue, and even wider in extent, which presents differences in abdominal appendages. This is perhaps the true *semiaquea*."

Typical *semiaquea* has been collected by the writer in North Carolina in April, both at Southern Pines and about Wilmington, mainly at Greenfield Pond. An example is figured on the accompanying plate, and it will be noted, that the dark colored portion of the hind wing reaches beyond the nodus in the central portion of the wing in the cells bordering M₃.

Tetragoneuria semiaquea subspecies *calverti* Mutt.

Bull. Wis. Nat. Hist. Soc. vol. 13, p. 53, June, 1915.

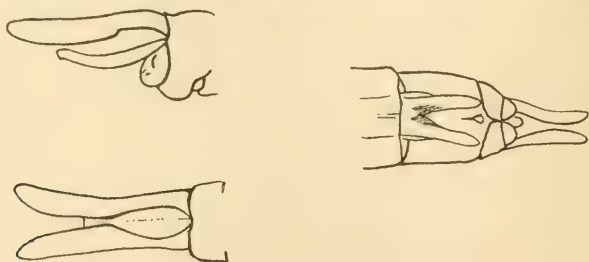
In the original description it is stated that the markings of the hind wings reach the nodus and beyond in *semiaquea*, while in *calverti* the markings do not reach the nodus. It is to be regretted that "Prof. Calvert's valuable material has been completely destroyed only a single *T. stella* escaped destruction," as related by Muttkowski in his 1915 paper, and an effort should be made to collect *calverti* in the type locality, which we understand to be Thomas County, Georgia. We have, however, specimens from much further north than Georgia that answer the description of *calverti*.

Tetragoneuria stella Williamson. Pl. IX, fig. 4.

Williamson (in Muttkowski paper) Bull. Wis. Nat. Hist. Soc. Vol. 9, pp. 95-99, 1911, pl. 6 (wings).

Muttkowski, Bull. Wis. Nat. Hist. Soc. Vol. 13, pp. 49, 58, 59, 1915.

In the original description the male abdominal appendages are described as follows: "Superior appendages seen in profile spatulate, with an obtuse inferior angle at one third the length, this angle inconspicuous; if the appendages of *stella* and any of the *cynosura* group are compared the differences in the superior appendages seen in profile are striking—*cynosura* high arched dorsally and excavated ventrically at the base, with a resultant prominent ventral angle, and a decidedly unsymmetrical outline; *stella*, on the other hand, without this arching and excavation, and with an outline almost symmetrical." "In Dr. Ris' opinion *stella* is quite distinct from all the *cynosura* group by the form of the abdomen (narrow, not spindle shaped), by the color of the abdomen, and by the superior abdominal appendages of the male, which are longer and have a second distal dilation" (Williamson).



T. STELLA, WILLIAMSON

In addition to the differences in the shape of the superior appendages in the males of *stella* and *cynosura*, noted by Williamson, I observe that the stigma of both fore and hind wings are longer in *stella* than in *cynosura*; also the insect is usually much lighter in color.

In his notes on synonymy, 1915, under *T. basigutta* Selys, described from "male from Florida (Coll. Selys); the female from Canton near Boston," Muttkowski states: "The female mentioned by de Selys is without doubt a true *cynosura*, while the male from 'Florida' may belong to some other species, possibly *stella*." The original description of *basigutta* fits more nearly *williamsoni* in size, color, etc., and de Selys' male may have been of that species.

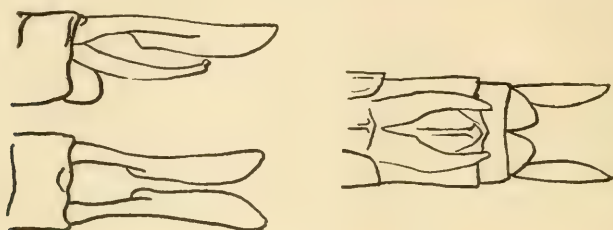
The male figured on the accompanying plate, is from Rockledge, Fla., March 2, 1904. It is one of the specimens from which the original description was prepared and kindly loaned to me by Mr. E. B. Williamson. Also from the Williamson collection we have examined the following six examples from Florida: St. Petersburg, March 24, 1913, 2 ♂; Moore Haven, March 29, 1921, ♂ (J. H. Williamson); Palmdale, April 3 and 6, 1921, 2 ♂, ♀ (J. H. Williamson). In the collection of Mrs. A. T. Slosson there is a male from Biscayne Bay, Florida.

Tetragoneuria petechialis Muttkowski. Pl. IX, fig. 5.

Bull. Wis. Nat. Hist. Soc., Vol. 9, pp. 95, 101, 1911.

In the original description of the typical material from Texas it is stated that the abdomen is long and slender as in *stella*, segments two and three moderately dilated. "Segment 8 as long as 9+10. Dorsum black, a yellow stripe occupying the lateral fifth of each side of 3 to 9, reduced on the posterior segments. Male appendages intermediate between *cynosura* and *stella*, though more nearly related to the latter . . . Wings hyaline, membranule white, slightly fumose at the lower end. Fore wings with small basal spot in C and Sc half way to or reaching the first antenodal, the first and second antenodals with a small fuscous spot surrounding the intersection at Sc. A linear spot surrounding the nodus. Hind wings with costal and subcostal streak half way or to the first antecubital. All antenodals with fuscous at the intersections, nodus with linear spot. A brown spot in the cubital space at the extreme base reaching to the marginal vein. A spot in the lower half of the anal triangle, following the oblique vein which divides this triangle, or filling the lower half. Costa of the fore wings yellow at base . . .

This species is at once distinct from the others by the narrow abdomen, the form of the appendages and the conspicuous spots at each antenodal of the hind wing." Muttkowski, 1911.



T. PETECHIALIS, MUTTKOWSKI

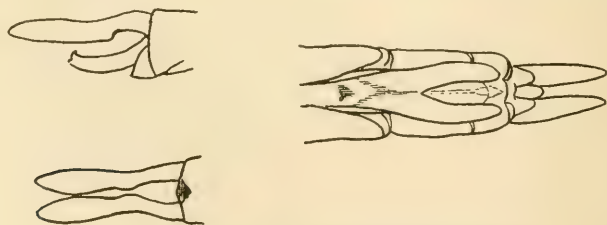
In the Bulletin, Kansas University, 1917, Clarence H. Kennedy shows that there is considerable variation in the color pattern of the wings in this species. In some specimens the ventral angle on the superior appendages in the male, is not as prominent as in the figure copied from Kennedy.

The specimen here figured is Paratype C 4., Cypress Mill, Texas, April 10, 1895 (1893 of Muttkowski's paper), kindly loaned to me by the Acad. Nat. Sciences of Philadelphia.

Tetragoneuria williamsoni Muttkowski. Pl. X, figs. 1 and 2.

Bull. Wis. Natural History Soc. (2) 9, pp. 95, 122. 1911.

Through the kindness of Mr. Williamson we are enabled to figure the male type from Wister, Oklahoma, June 3, 1907.



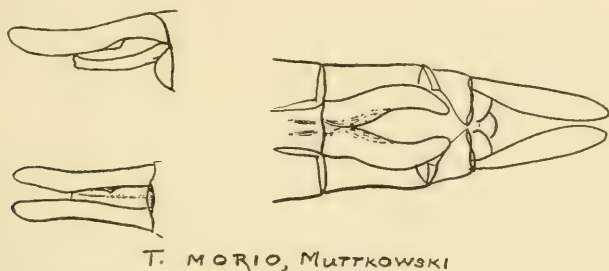
T. WILLIAMSONI, MUTTKOWSKI

A second male from Tampa, Florida, February 28, 1921 (E. L. Bell), Davis collection, is also figured. These illustrations will show the character of the wing maculation, the slender abdomen, and the rather long and slender appendages.

Tetragoneuria morio Muttkowski. Pl. X, fig. 3.

Bull. Wis. Natural History (29), pp. 96, 125, 1911.

The original description states: "Male appendages in dorsal view like those of *spinigera*, that is twice curved and with the tips approximated. In lateral view somewhat like *cynosura*, but with a longer, slightly produced angle, and no lateral ridge." "Wings hyaline, fore wings without color, hind wings with brown reaching the first antenodal in C and Sc. Brown at the intersections of the arculus, at the ends of the triangles and anal veins. A large blot in the lower anal triangle and the adjoining two series of veins."



The above description was made from the male type from Solon Springs, Wisconsin, a male from Maine now in the Williamson Collection, and two females, one from Maine and the other from Detroit, Mich. Through the kindness of Mr. T. E. B. Pope of the Milwaukee Museum, I have been able to examine the type and the two lower left figures in Muttkowski's cut, here reproduced, fairly represent the appendages. Muttkowski states that they are from the type. Mr. E. B. Williamson writes: "Of Muttkowski's figs. p. 125, the two lower left hand agree fairly well with the paratype which does not agree at all with the right hand figures." We do not know the source of the lower right hand figures.

In the original description the species is recorded from Wisconsin, Michigan and Maine. In his Manual of the Odonata of New England, Dr. Howe adds New Hampshire and Massachusetts, and states that it is rare.

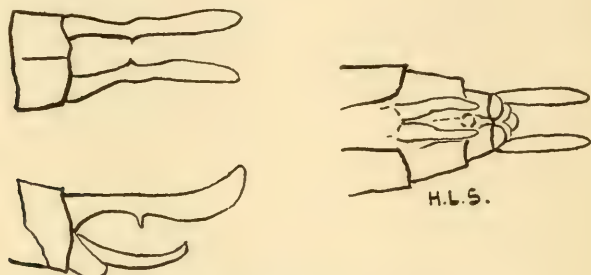
Tetragoneuria spinigera (Selys) Selys. Pl. X, figs. 4 and 5.

Bull. Acad. Belg. (2) 31, p. 269, 1871.

Syn ? *costalis* Selys, Bull. Acad. Belg. (2) 31, p. 273, 1871.

Syn. *indistincta* Morse, Psyche. 7, 210, 1895.

The original description states that in the male: "The upper anal appendages bear below on the inner side a long spine which is inclined downwards (instead of a single angular tubercle)," and that there is: "A brown basal droplet in the fore wings between the subcostal and the median vein." The female was unknown to de Selys.



T. SPINIGERA SELYS

Muttkowski in 1911, states: "This species is more easily distinguished than any of the preceding, notably by the male appendages which have an inferior spine, and by the female vulvars which approximate each other also by the female appendages which usually reach a length of 2.7 to 3 mm." He also quotes a letter from Dr. Calvert giving the results of his examination of the female type of *T. indistincta* Morse from Winchendon, Mass., and the conclusion reached that it is probably the same as *spinigera*. Muttkowski adds: "In placing *indistincta* with *spinigera* I base its identity upon the black T-spot, the length of the appendages and color description, all of which agree perfectly with *spinigera*."

In the original description of *indistincta* it is stated that "the basal part of median space and basal antecubital cell of each series fuscous." Dr. Calvert states, as cited above, that this "refers only to the hind wings, not to the front, on which there is merely a very small brown spot in the subcostal space."

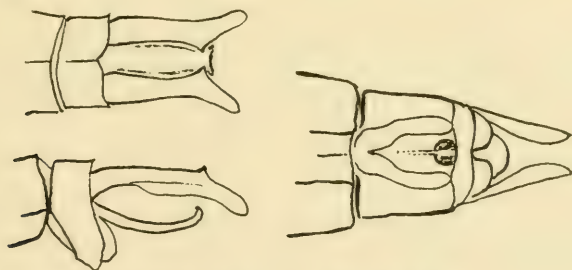
The writer has collected *spinigera* at Newfoundland, N. J., in May and June; also at Portageville, Wyoming County, and at West Point, N. Y., in June. From the localities given by Muttkowski and in the writer's experience, this species appears to be of northern range. I have no records from the southern states.

Tetragoneuria spinigera var. *suffusa* new variety. Plate XI, figs. 1 and 2.

Among the specimens of *spinigera* there is a female from Newfoundland, N. J., May 28, 1910, and a female from West Point, June 4, 1916, that differ from typical *spinigera* in the same way that subsp. *simulans* Muttkowski differs from typical *cynosura* Say, namely, in having the dark markings of the hind wings reaching the triangle or beyond. There is also in the writer's collection a male of this variety, here designated as *Tetragoneuria spinigera* var. *suffusa* from Hudson Highlands, June 25, 1916 (F. M. Schott). The type from Newfoundland, N. J., and the male from the Hudson Highlands are figured on the accompanying plates. Figure 5, Plate X, may be considered an intermediate.

Tetragoneuria spinosa (Hagen) Selys. Plate XI, figs. 3 and 4.
Bull. Acad. Belg. (2) 45, p. 188, 1878.

The original description states that this species described from Georgia is: "Related to *cynosura* and *spinigera* male. In size it is nearest to *spinigera*. It differs from that species as also from the five allied species or races in the upper anal appendages which have above on their last quarter a short, thick, but sharp tooth, very distinct if one looks at the appendage in profile. *Spinigera* has no such tooth, but has a spine on the first third below. The other species, *cynosura*, *semiaquea*, *complanata*, have neither of these spines."



T. SPINOSA, HAGEN

This well-marked species, of which we figure a male from Clementon, N. J., April 27, 1903 (V. A. E. Daecke), and a female from Old Bridge, N. J., April 23, 1910 (Wm. T. Davis), is rare in collections. A male now in Mr. Williamson's collection was also captured at the time the female was taken at Old Bridge.

Tetragoneuria canis MacLachlan. Plate XI, fig. 5. Ento. Mo.
Mag. 23, p. 104, 1886.

The original description states: "Appendages black. The superior appendages (3 mm.) not quite as long as the 9th and 10th segments combined: viewed above, they are straight, convergent, and sub-cylindrical, but somewhat before the apex they dilate, and become almost two-branched, the inner branch forming a short triangular tooth, the outer being much longer, curved outwardly, and stout and obtuse at the apex, its inner edge excised: viewed from the side, the appendages are very straight, gradually thickened, with a triangular production or tooth near the middle of the lower edge; the apical portion in this position may be compared in form to a dog's (or wolf's) head, with long profile and short erect ears. Inferior appendage extending to the portion of the superior, where these latter become suddenly altered in form (yellowish internally above), rather broad, slightly curved upward, the apex broadly excised, leaving the outer angles very prominent."



T. CANIS, MACLACHLAN

This species has a wide distribution extending across the continent from Maine and New York to Washington and California; also in Canada. The male figured is from Napa, California, June 9, 1914 (C. H. Kennedy Collector). The writer captured a male at West Danby, N. Y., May 30, 1915.

In Bulletin 47, N. Y. State Museum, 1901, plate 22, fig. 2, Dr. Needham, under the name of *Tetragoneuria spinosa* (referred to *canis* by Muttkowski) gives an illustration of a female which he states "exhibits a singular type of coloration for this genus. The wings were of a rich flavescent brown, with spots of black on a number of the antenodal crossveins" of the hind wings. The figure is said to be "nat. size," but as the insect is shown as having an expanse of wing of 100 mm., it is remarkable in that particular also.

Tetragoneuria costalis (Selys) Selys. Bull. Acad. Belg. (2) 31, p. 273, 1871.

Type ♀, British Museum, L. C. (2) 37, p. 20, 1874, notes.

Costalis is at least a variety or race and may be a species, but

this cannot be determined at this time for lack of specimens from Georgia.

It was considered a subspecies of *cynosura* by de Selys, but he says that it differs "in having the costal margin of the four [4] wings opaque brown between the costal vein and median to the nodus, and in the same manner to the pterostigma, between the costa and the principal sector, as also the hypertrigonal space. In the hind wings the brown basal spot against [or close to] the membranula does not exist but one notices the two small brown drops of the extreme base." The type from Georgia, America, was stated to be in the British Museum.

On pages 132 and 133 of his 1911 paper, Muttkowski published a more detailed description of the type of *costalis* from a letter from W. F. Kirby, June 14, 1911. From this description we learn that the appendages are "straight, black, 4.5 mm. long," and that there is a "broad subhyaline brown bar extending along the whole costal and subcostal areas of all the wings as far as, and including the cell. The lower basal cell, the upper more faintly, and the space above the upper sector of the arculus to the level of the nodus, the space above the triangle, and even the triangle itself on the hind wings, are less deeply stained with smoky brown."

Muttkowski adds: "It is chiefly because of the length of the female appendages that I regard this species as distinct. These are the longest of any known species of *Tetragoneuria*, the nearest species *spinigera*, reaching 3.3 mm." He thinks it is not closely related to *cynosura*, but more likely to *spinigera*, and probably *spinosa* (of which the female is unknown to me)."

The appendages of the female *spinosa* taken at Old Bridge, N. J., are but 2 mm. in length, so it is not closely related to that species.

Muttkowski in 1915, p. 60, states: "It appears to me that an identity of this form [*costalis*] with *T. canis* as an aberration of the latter, is not a too far fetched assumption." In his 1911 description of the type of *costalis*, Kirby states that there are "4 antenodals and 7 postnodals on hind wing." In *canis* the hind wings generally have 5 antenodal cross veins according to Dr. Needham, and I also find that to be the case in the specimens I have examined. Also the female appendages do not appear to exceed 3 mm. in length and are not straight, nor 4.5 mm. long, as described in *costalis* by Kirby. It appears, therefore, that Muttkowski's surmise in 1911, that *costalis* is more nearly related to *spinigera*, may be correct. However, as we know the species *spinigera* has not yet been found as far south as Georgia. In wing markings *costalis* and *petechialis* appear to be somewhat alike.

EXPLANATION OF PLATES

PLATE IX

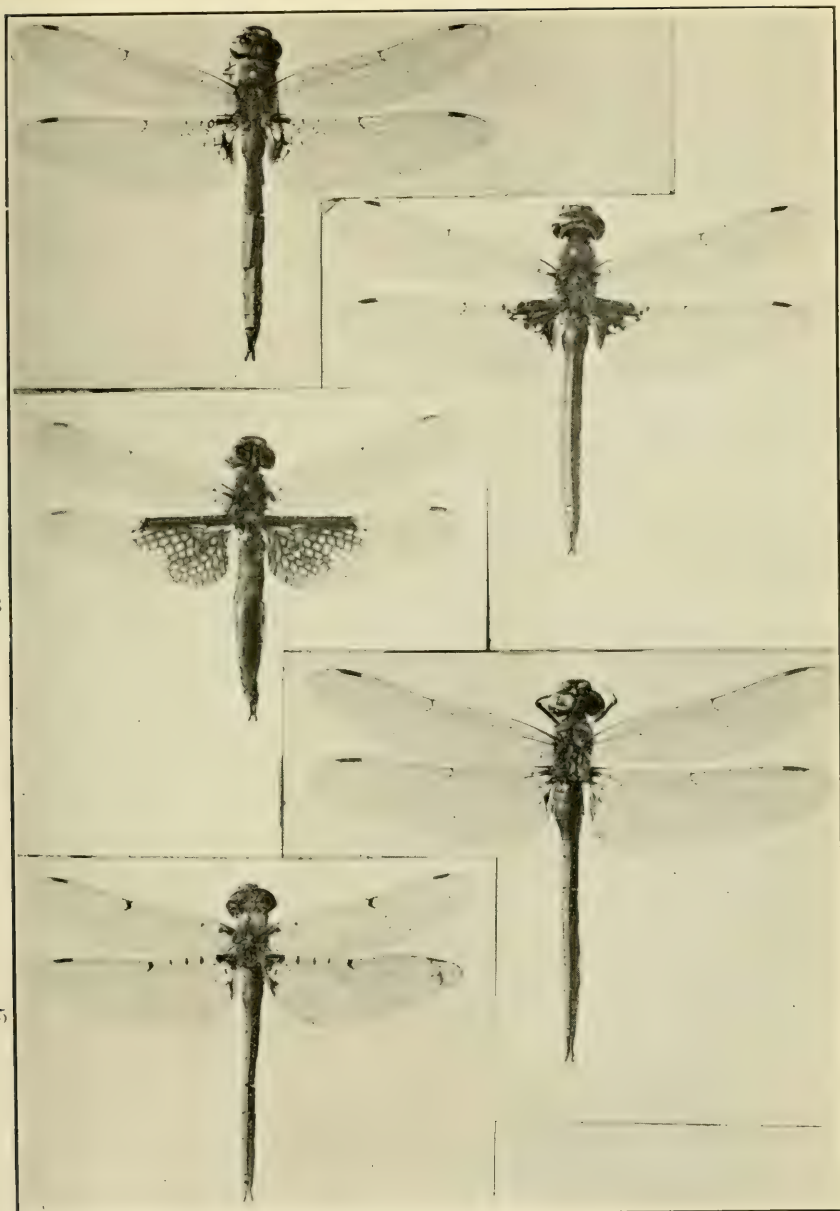
- Fig. 1. *Tetragoneuria cynosura* Say. Concord, Mass. (R. Heber Howe, Jr.)
- Fig. 2. *Tetragoneuria cynosura* subsp. *simulans* Mutt. Bluffton, Ind. (E. B. Williamson.)
- Fig. 3. *Tetragoneuria semiaquea* Burmeister. Southern Pines, N. C. (A. H. Manee.)
- Fig. 4. *Tetragoneuria stella* Williamson. Rockledge, Fla. (Mrs. C. C. Deam.) Williamson Collection.
- Fig. 5. *Tetragoneuria petechialis* Mutt. Paratype. Cypress Mill, Texas. Collec. Acad. Nat. Sci., Philadelphia.

PLATE X

- Fig. 1. *Tetragoneuria williamsoni* Mutt. Type. Wister, Okla. Williamson Collection.
- Fig. 2. *Tetragoneuria williamsoni* Mutt. Tampa, Fla. (E. L. Bell.) Davis Collection
- Fig. 3. *Tetragoneuria morio* Mutt. Concord, Mass. (R. Heber Howe, Jr.) Williamson Collection.
- Fig. 4. *Tetragoneuria spinigera* (Selys). West Point, N. Y. (Wm. T. Davis.) Davis Collection.
- Fig. 5. *Tetragoneuria spinigera* (Selys). Squam Lake, N. H. (R. Heber Howe, Jr.)

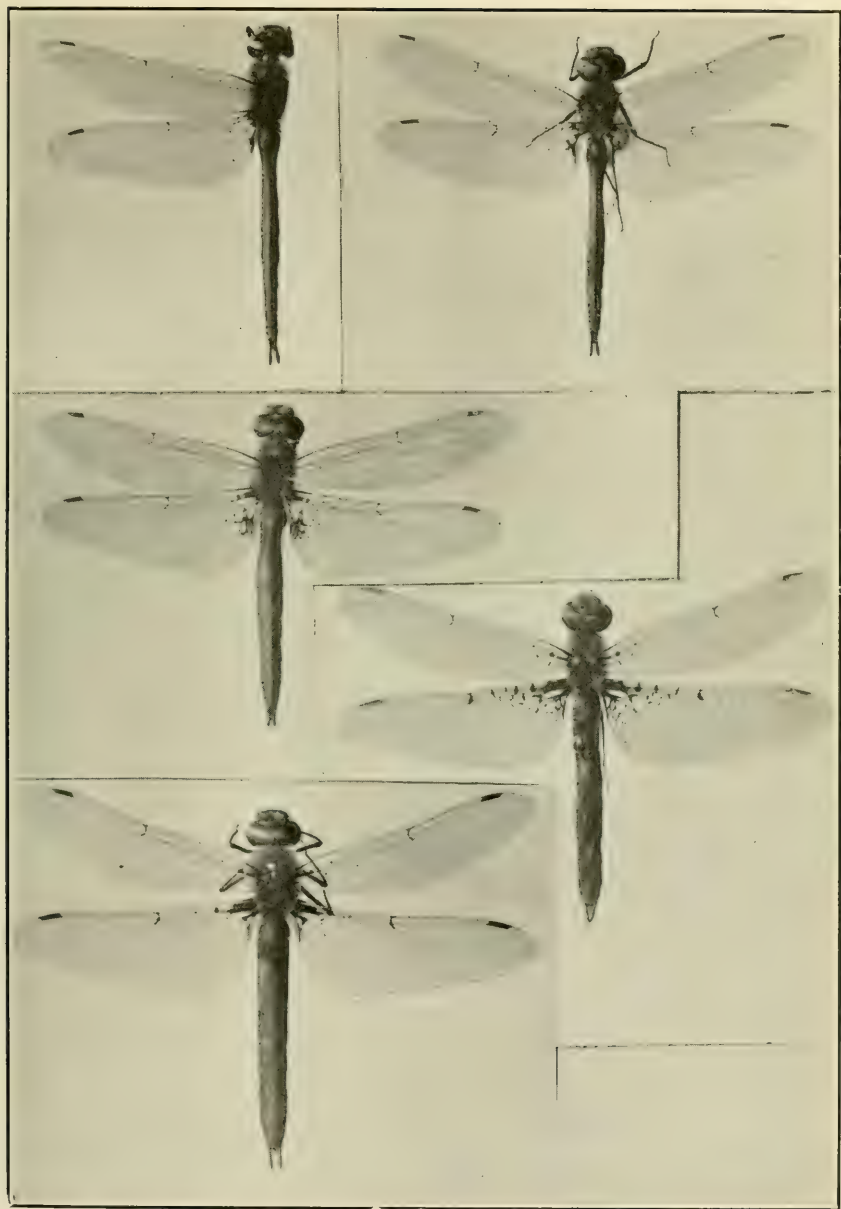
PLATE XI

- Fig. 1. *Tetragoneuria spinigera* var. *suffusa* Davis. Type. Newfoundland, N. J. (Wm. T. Davis.) Davis Collection.
- Fig. 2. *Tetragoneuria spinigera* var. *suffusa* Davis. Hudson Highlands, N. Y. (F. M. Schott.) Davis Collection.
- Fig. 3. *Tetragoneuria spinosa* (Hagen). Clementon, N. J. (V. A. E. Daecke.) Davis Collection.
- Fig. 4. *Tetragoneuria spinosa* (Hagen). Old Bridge, N. J. (Wm. T. Davis.) Davis Collection.
- Fig. 5. *Tetragoneuria canis* MacLachlan. Napa, Calif. (C. H. Kennedy.) Williamson Collection.



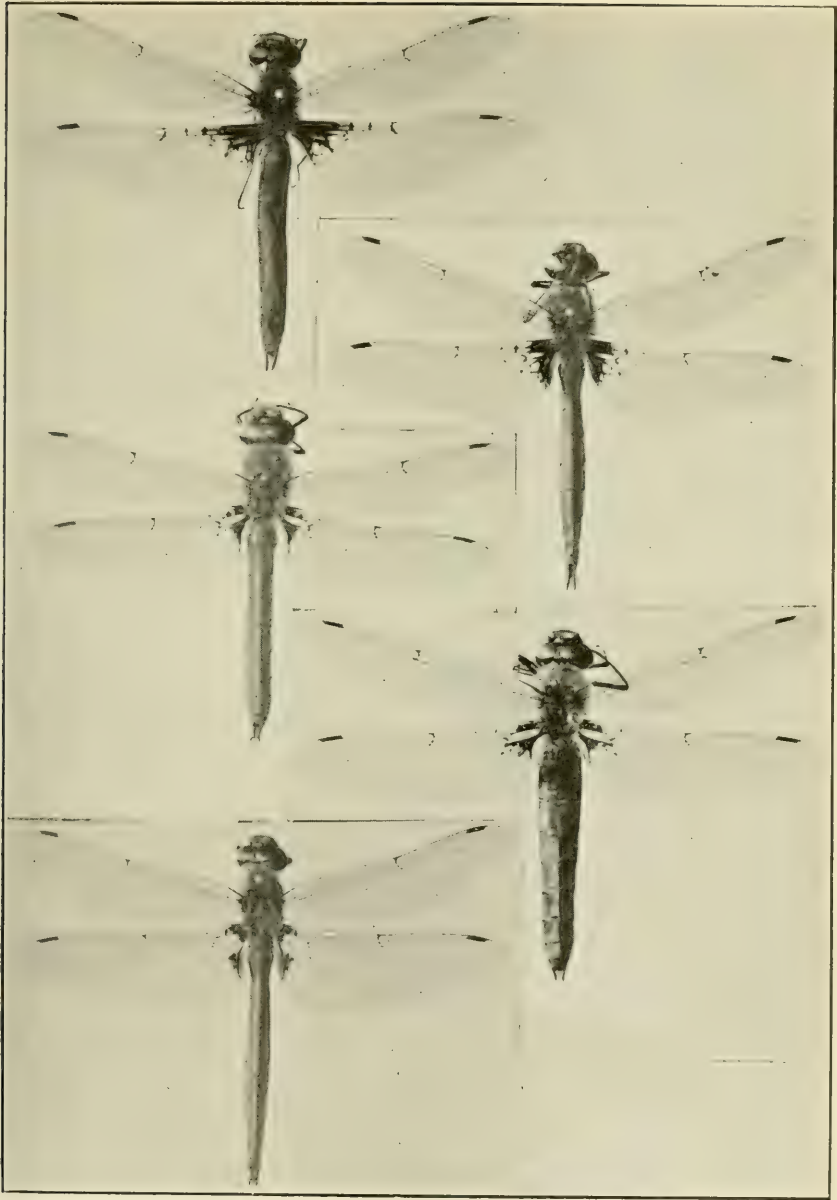
1. *T. cynosura* Say.
3. *T. semiaquea* Burm.
5. *T. petechialis* Mutt.

2. *T. cynosura* subsp. *simulans* Mutt.
4. *T. stella* Williamson.



1. *T. williamsoni* Mutt.
3. *T. morio* Mutt.
4. *T. spinigera* Selys.

2. *T. williamsoni* Mutt.
5. *T. spinigera* Selys.



1. *T. spinigera* var. *suffusa* Davis.
3. *T. spinosa* Hagen.
5. *E. canis* MacLachlan.

2. *T. s.* var. *suffusa* Davis.
4. *T. spinosa* Hagen.

ON THE AMERICAN SPECIES OF ALOBATES MOTS.
(COL. TENEBRIONIDAE)

BY KENNETH W. COOPER, Flushing, N. Y.

Dissection of specimens of the genus *Alobates* Mots. (*Nyctobates* Guer.) has brought to light some interesting information concerning the separation of the species by the use of the male genital tube. *Barbata* Knoch., which at one time was regarded by some as no more than a variety of *pennsylvanica* DeG., differs radically from *pennsylvanica* in the shape and structure of the penis, and may be separated at a glance from that species. A large number of *pennsylvanica* and *barbata* were dissected and showed a remarkable constancy in their respective forms. However, a Florida form of *pennsylvanica* shows a slight, yet immediately noticeable, difference from the typical form of genital structure found in that species. Whether or not this difference in structure is actually of specific, subspecific or varietal value is difficult to state, but in view of the remarkable difference in genital structure found in comparing two known species, *pennsylvanica* and *barbata*, the differences noted in the Florida form appear too slight for the establishment of a new species. Nor does it seem advisable to establish a new subspecies or variety on this structure, which does not differ materially in shape or size from a typical *pennsylvanica* form, and thus possibly add still another synonym to the long list following *pennsylvanica* in the catalogs. However, as all of the previously described forms of *Alobates* have had mention made only of their external structures, and as the species of this genus are notorious for their variable sculpture and form, any definite determination of this Florida form with a previously described species does not seem probable.

The accompanying plate represents comparative form only, no attempt has been made at reproducing these organs on paper to a set scale. Because of the corrosive action of the reagents upon the softer parts, the fleshier structures of the ventral surface of the basal piece must not be allowed to bear too much weight in consequent determination of species. The more set characters are found in the variations of the median and lateral lobes.

Barbata is at once separated from *pennsylvanica* by the peculiar acuminate process formed by the lateral lobes. In neither species is the median lobe visible from above, and in *barbata* it is much narrower than in *pennsylvanica*. The suture separating the lateral lobes dorsally is much more prolonged basally in *barbata*

than *pennsylvanica*. It is interesting to note that, even when the specimen of *barbata* is much larger than a *pennsylvanica*, its genital tube will almost invariably be found smaller in size than in the latter species.

Repeated attempts to procure specimens of Horn's *subnitens* all resulted in failure, but for determination purposes the aberrant third joint of the antennae should easily separate it from the other forms of *Alobates*. It is included in the following table with the hope that it may soon be brought to light, for to the best of my knowledge it has not been found since it was first described.

KEY TO U. S. SPECIES OF ALOBATES MOTTS.

1. Antennae with third joint nearly equalling the three following together; prosternum convex between the coxae, elevated in a slight tubercle at tip *subnitens* Horn.
 Antennae with the third joint approximating in length the two following together; prosternum slightly convex between the coxae but not tuberculate at tip (2)
2. Under surface of mentum tufted with long, yellowish hairs; elytral rows of punctures usually coarser. Male genital tube spine-like at apex (fig. 3) *barbata* Knoch.
 Under surface of mentum not tufted with yellowish hairs; punctures of elytral rows finer, more minute. Male genital tube truncated at apex, not acuminate (fig. 1) *pennsylvanica* DeG. (for comparison of the Florida form a third statement and alternate has been introduced) . (3)
3. Basal suture of the lateral lobes of the male genital tube not emarginate medially on the dorsal surface; outer apical angles of the lateral lobes rounded; dorsal suture of the lateral lobes shorter; median lobe broader, extending visibly beyond the apical half; sutures of lateral lobes ventrally extending nearly to basal fourth (fig. 1) *pennsylvanica* (typical)
 Basal suture of the lateral lobes of the male genital tube with very evident median emargination; outer apical angles of the lateral lobes obtuse, angulate; dorsal suture of the lateral lobes longer; median lobe more narrow, visible only in apical half; sutures of lateral lobes ventrally extending only to anterior portion of basal half (fig. 2) Florida—*pennsylvanica* aberration

The Florida form does not differ materially in external aspect from the more deeply punctate forms of *pennsylvanica*. The easily noted difference in genital habitus is so slight in comparison with the vast differences between *pennsylvanica* and *barbata* that it is published only for interest's sake. Description of the

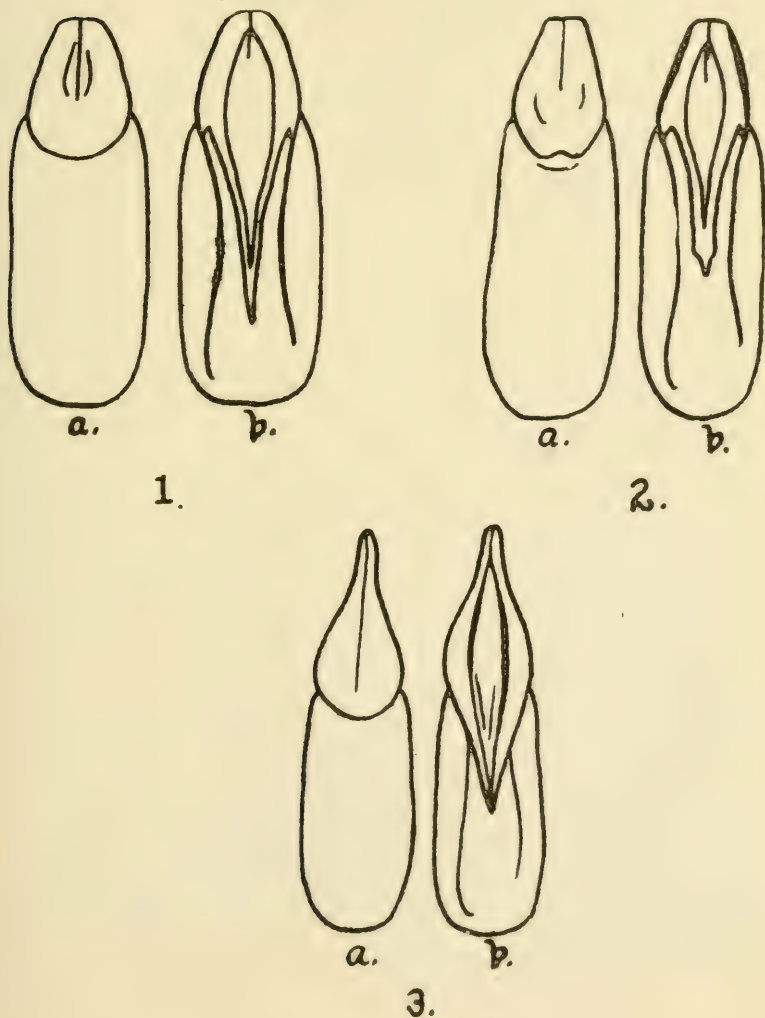
shell of this form would not suffice to separate it from *pennsylvanica*, and certain recognition can come only from examination of the male genital tube.

EXPLANATION OF FIGURES

(all of male genital tube)

a.—dorsal aspect b.—ventral aspect

1. *pennsylvanica* DeG.
2. Florida variation of above
3. *barbata* Knoch.



THE CLEANING OF GREASY INSECTS.

By GEORGE P. ENGELHARDT, Hartsdale, N. Y.

Inquiries regarding the cleaning of greasy insects are frequently addressed to the Editorial Board or the BULLETIN.

Our method is simple, effective and well-known. It is the use of high test gasoline in a shallow covered glass container, to the depth of about one and one-half inches.

The number of specimens to be cleaned at one time, of any Order, will be governed by the size of the container. The insects should be completely immersed, but not crowded. Name and locality labels may be left on the pins. The time for the degreasing process depends upon the condition, age, nature and size of the specimens. One or two days may be enough; one, two, or even more weeks will not do any harm. It is a good policy to subject all insects with a tendency to become greasy to this treatment as a part of their preparation, either before or after mounting.

Upon removal from the benzine (gasoline) the insects are placed in another shallow container filled with fine corn-meal. They should rest reversed upon the thorax and abdomen to assure rapid absorption of moisture. Corn-meal is preferable to plaster of Paris and gypsum because its fine grains do not adhere to the specimens after drying. Butterflies, moths and hairy insects in general while drying should be exposed to a slight circulation of air to effect the natural readjustment of fringes, hair, etc.

Some entomologists prefer other grease solvents, such as chloroform, ether, carbon bisulphide, gasoline, benzol. All, no doubt, will accomplish the same purpose in the same way, the difference being largely one of cost, inflammability and efficiency of the liquids as solvents of greases. Carbon tetrachloride is being recommended of late. This is non-inflammable and if mixed with other solvents at the rate of 25 per cent. to 50 per cent. it will render them non-combustible to a greater or less degree. A favorite medium in England is toluol, formula C_7H_8 , used in the following way: Take three shallow covered containers filled to a suitable depth with toluol. Immerse your specimens for 24 hours in the first container, then for another 24 hours in the second one and lastly for 24 hours in the third, which process is said to bring about complete rejuvenation. This process can be made a continuous performance by replacing the first lot of specimens by others as they are removed from one container to the next.

THE RECENT NORTH-EASTWARD SPREAD OF THE
ORANGE SULPHUR BUTTERFLY, *COLIAS*
EURYTHEME BOISDV. (LEPIDOPTERA).

By W. E. BRITTON AND CHARLES RUFUS HARTE,
New Haven, Conn.

In bygone days when the senior author used to collect butterflies in New Hampshire and later in Connecticut, he neither collected nor saw the orange sulphur butterfly, yet in 1932 this was a common species in both states. The distribution given in some of the publications is as follows: Morris, Synopsis of Lepidoptera of North America, 1862, "California, Mexico and some of the States"; Scudder, Butterflies of New England, 1889, records this butterfly as a western species and gives a half page of localities, ending with the following paragraph: "Single specimens have also been taken a few times in New England, namely, in Norwich, Conn. (McCurdy); Wollaston (F. H. Sprague) and Belmont, Mass. (Maynard); Montpelier, Vt. (P. S. Sprague) and Mt. Desert, Me., a single specimen seen (Thaxter)"; French, Butterflies of the Eastern United States, 1890, "Western States to the Pacific; occasionally in Middle States to Massachusetts"; Blatchley, Butterflies of Indiana, 1891, two forms of *eurytheme* "occur occasionally in various parts of the State, but are nowhere common." "Food plant, white and buffalo clover"; Beutenmüller, Butterflies of the Vicinity of New York, 1893, "A single pair of this species was taken by the late S. L. Elliot at Astoria, Long Island"; Dyar, List of Lepidoptera, 1902, "Rocky mountains, Pacific States"; Comstock, How to Know the Butterflies, 1904, "The species is most abundant in Mississippi Valley, but it is found on the Pacific coast and also along the Atlantic coast as far as Maine"; Smith, Insects of New Jersey, 1910, "very occasional and hardly a regular inhabitant of the State. It is common in the Central States"; Weed, Butterflies, 1917, states that is rarely found north of latitude forty degrees; Elrod in Butterflies of Montana, 1906, says "It extends from the Atlantic to the Pacific, and from Canada to the far south, though it is rare in the south," and Montana records are given. Holland's Butterfly Book (both editions) gives a similar range for *eurytheme* but says it is rare "in the lower parts of Florida and Texas in the hot lands."

From Canadian Entomologist, we learn that Dr. Bethune captured a specimen in 1871, at Sault Ste. Marie, after a difficult chase, and he describes the flight habits of this butterfly in con-

trast with those of *philodice*; that Pearson collected a specimen in Montreal, in 1875; that Sprague captured a specimen at Wollaston, Mass., October 8, 1879; in recent years according to Bulletin Brooklyn Entomological Society, Carroll collected this butterfly in Brooklyn, N. Y., in 1914 and 1918; and from Journal of the New York Entomological Society, Shoemaker took it in New York, in 1916; on Saten Island, Ragot took it in 1925, and W. T. Davis in 1927; Watson reported it as fairly abundant around New York City in 1927, and as common in 1930; Klots mentioned the abundance of this species at Ithaca, N. Y., in August, 1928, and Brower captured several specimens there in July and September, 1930.

Leonard's List of the Insects of New York (1928), gives ten localities from Long Island to Rochester, at two of which it is "reported fairly common." Saunders in Butterflies of the Allegany State Park (New York), 1932, states that this butterfly is of regular occurrence in the park and is not uncommon.

According to Clark, Butterflies of the District of Columbia, 1932, this species was rare in the vicinity of Washington, until a few years ago. In 1925, it was occasional in certain meadows "the greatest number seen in one day was three." Since then it has been much more common, and in 1930, both sexes of *eurytheme* outnumbered the corresponding sexes of *philodice*. Mr. Clark captured or observed the orange sulphur in eastern Massachusetts at Ipswich, August 25, 1925, and August 28, 1930; Essex, August 30, 1925; Newton, August 25, 1930.

Eurytheme is not included in Fernald, Butterflies of Maine, 1884; McIntosh, Butterflies of New Brunswick, 1899; Fiske, Butterflies of New Hampshire, 1901; Davis, Illustrated Catalogue of Butterflies of Lackawanna County, Pa., 1915; or Britton, Check-List of the Insects of Connecticut, 1920, although some Connecticut records have since come to hand.

In Entomological News, Vol. XXXVII, p. 97, 1926, Roswell C. Williams published a list of butterflies collected at Avon, Conn., where he spent from two to four week-ends each summer from 1902 to 1914, but *C. eurytheme* is not included and probably was not taken or observed by him.

On October 14, 1930, a specimen of *eurytheme* was received at the Experiment Station collected at Fairfield, by Aretas A. Saunders. On October 13, 1930, J. R. Haskin (see Ent. News, xlii, 201) collected a female *eurytheme* at Waterford. On October 3, 1931, the junior author collected two males and a female in the clay pit of a brick yard at Berlin, and in 1932 he

collected the species at Berlin, Cheshire, Goshen, Hamden, Milldale, New Haven, New London, Plainville, Plantsville, Old Saybrook, Torrington and West Haven. In 1932, the senior author collected a male at North Branford, July 24; D. S. Lacroix collected a female specimen at Windsor, August 7; J. P. Johnson collected a female specimen at Nichols, October 4; and J. C. Schread picked up a dead female specimen on the sidewalk near the Experiment Station, November 4. On August 5, the senior author observed a specimen in flight when driving through Morse Street, Hamden, and on August 8 he saw a brilliant specimen flying over the New Haven Green.

When on vacation, the senior author, September 23, 1932, collected a male and female in Surry, New Hampshire, about two miles north of the village. He also saw this butterfly in flight at the village, on Mine Hill about four miles southwest of the village and on the hills some four miles north of the village near the Alstead line. The first week in October he saw an orange butterfly flying over a field in Unity about six miles south of Claremont.

A. E. Brower, *Jour. N. Y. Ent. Soc.*, Vol. XL, p. 510, 1932, reports that five females and one male were collected at Bar Harbor, Mt. Desert Island, Maine, in August and September, 1932. Three specimens were taken and three others seen in July and August in the vicinity of Lincoln and Enfield in the Penobscot Valley. Two specimens were observed in southeastern Maine near Northfield about 20 miles from the New Brunswick border.

Professor C. P. Alexander writes that he observed two or three specimens of this butterfly flitting over fields of legumes on the College farm at Amherst, Mass., on August 14, 1932.

The valley of the Connecticut River above Middletown, Conn., and of that portion of the Quinnipiac River which at one time doubtless was the lower valley of the Connecticut, has large deposits of excellent brick clay which have been worked for a great many years. Many pits still are being worked; others, for one reason or another, have been abandoned. Occurring in low ground, the majority require pumping, and as soon as this is stopped fill up with water, but there are some localities where the evaporation is sufficient to dispose of the inflow, and of this character are many of the pits about Berlin, some 26 miles north of New Haven.

Like many other similar spots the low ground of Berlin seems to be of much higher average summer temperature than the surrounding broken country, while the deep pits afford unusual

shelter from the wind. On various occasions the junior author has found butterflies apparently at home in these pits although when seen elsewhere in the territory they behaved as strays. When, therefore, on August 3, 1931, a small deep-orange-colored butterfly was seen at Berlin, fighting with a male roadside yellow, he was overjoyed at seeing, as he supposed, an old friend of his childhood in southern Ohio: *nicippe*. In fact he was so delighted that he threw caution to the winds, and once more learned how easily a two-inch butterfly can evade a fourteen inch diameter net. *Nicippe*, however, had been remembered as a rather lazy flyer, and the powerful, erratic flight of this Berlin butterfly was rather surprising. At that, however, it did not act like an accidental visitor, but flew across the clover field in which it first had been seen, into one of the pits at the nearest point as if it knew just where to go.

Opportunity did not offer to get to Berlin again until on October 3, but on that date, in the dry pit into which the supposed *nicippe* had fled, two males and a female which proved to be *eurytheme*, were seen and taken, while a faded creature which escaped had what later proved to be very characteristic of the species: a vigorous erratic flight markedly different from that of the roadside yellow.

The junior author always has been greatly interested in the out-of-doors. As a small boy he actively collected butterflies in southern Ohio; when, therefore, during the period from 1909 to 1915 he again collected with his two boys, in Connecticut, he had a background to help him recognize any southern forms, as well as to assist him in field recognitions, and while an unhappy experience with pests which destroyed practically the entire collection somewhat dulled his enthusiasm, he kept fitful notes until discussion with the senior author regarding the butterflies of New Haven led him again to active collecting. The fact, therefore, that up to August 3, 1931, he had neither noticed nor heard of any record of a butterfly so characteristic—at least, in the orange form—as *eurytheme*, while no real proof, warrants as reasonable the inference that during that earlier period the butterfly at least was uncommon, for so far as we have been able to learn, the junior author's records for 1931 are unique. What occurred in 1932, therefore, is little short of astounding, and can best be described as an explosion of the species.

Berlin furnished the first record, a single male, on June 5; on July 2, however, at Cheshire, it was almost as common as the roadside yellow, and by the middle of that month over certain

fields of clover and of alfalfa in that locality it was appreciably more numerous. An appended table gives the record for the year, and it is to be noted that except for the Berlin cases, these records were made incidental to business or other trips, and not at all as the result of special or systematic efforts. By August the butterfly seemed pretty generally distributed through the southern half of the state; August 9 it was common at Goshen, in the northwest corner; September 18 four specimens were taken at Simsbury, near northerly boundary at the center line of the state; October 2 it was common at Granby, at the center of the north boundary, and on October 4 it was common at Bennington, Vermont. The last record for the season was at Westville, a westerly section of New Haven, where it had been present most of the summer, a single specimen being seen on October 25.

It should be remembered that these records are random ones; it is entirely possible that *eurytheme* was common at the points named at much earlier dates without having been recorded, as the 1932 records for Surry, New Hampshire, and Amherst, Massachusetts, given in the earlier section of this paper would indicate. It is interesting, too, to note that while Mr. Williams saw no specimen at Avon, Connecticut, in 1926, the junior author found it there on three occasions in September, 1932, and that on the 10th of that month it was common.

The orange form is so noticeable from its coloration that there is little reason to suppose it has heretofore escaped the many nature students of the territory, and while on the score of coloration alone the paler forms might well have been mistaken for the roadside yellow, the flight is so different from that of its common relative that it would seem that no good observer could fail to note it. At the same time, there is the fact that with the exception of Dr. Bethune at Sault Ste. Marie in 1871, no one until very recently seems to have commented on this peculiarity of the species.

Just what is this difference in flight, while very obvious to the eye, is not easy to describe, for what may be termed the flight patterns are very similar, but there is a vigor and determination at all times on the part of *eurytheme* that is absent in the case of *philodice*, even when in frightened flight.

It will be very interesting to see if this robust and thriving butterfly does not crowd out the roadside yellow, just as the European cabbage butterfly has replaced our native species.

Some occurrences of the *eurytheme* in Connecticut and to the northward:

August	3, 1931	Berlin,	Connecticut	I
October	3, 1931	"	"	3
June	5, 1932	"	"	I
July	2, "	Cheshire	"	Common
"	3, "	*Westville	"	I
"	10, "	Berlin	"	Common, faded
"	14, "	*West Rock	"	I
"	16, "	Milldale	"	Common
"	17, "	*Hamden	"	"
"	21, "	Berlin	"	"
"	24, "	Plantsville	"	I
"	31, "	*Westville	"	I
August	1, "	* "	"	I
"	4, "	Old Saybrook	"	I
"	4, "	New London	"	3
"	9, "	Torrington	"	2
"	9, "	Goshen	"	Common
"	11, "	*Westville	"	2
"	11, "	New Haven Green	"	I
"	11, "	*West Haven	"	I
"	11, "	*Woody Crest	"	3
"	13, "	* " "	"	3
"	17, "	Plainville	"	Very Common
"	17, "	Farmington	"	Common
"	20, "	"	"	"
"	22, "	*Westville	"	I
"	25, "	* "	"	I
September	5, 1932	Avon	"	2
"	5, "	*West Rock	"	I
"	10, "	Avon	"	Common
"	14, "	*Hamden	"	4
"	15, "	*Westville	"	I
"	17, "	* "	"	I
"	17, "	*Centerville	"	Common
"	18, "	Avon	"	4
"	18, "	Simsbury	"	4
"	23, "	*Westville	"	3
"	25, "	Simsbury	"	Common
October	2, "	Granby	"	"
"	4, "	Bennington,	Vermont	"
"	9, "	Cheshire,	Connecticut	"
"	9, "	Milldale	"	Very Common

"	15,	"	*Westville	"	I
"	15,	"	Tariffville	"	I
"	15,	"	Congamond,	Massachusetts	3
"	25,	"	*Westville,	Connecticut	I

* Very close to, or suburb of, New Haven.

Rating scheme.

<i>Very Common</i>	10 or more to be seen in course of an hour.
<i>Common</i>	5 or 6 to be seen in the course of a morning or an afternoon.
<i>Not Uncommon</i>	1 or 2 to be seen in the course of a day.
<i>Uncommon</i>	2 or 3 to be seen in the course of a season.
<i>Rare</i>	Not more than 1 on an average to be seen in the course of a season.
<i>Accidental</i>	Not found oftener than once or twice in 5 or 6 years.

***Xenorhipis brendeli* Lec. from Long Island. (Coleoptera-Buprestidae)**—There occurs in the New York State List of Insects but a solitary record (Brooklyn, L. I. [Horn]) for this interesting species which Mr. A. S. Nicolay remarks as "probably the rarest of our eastern buprestids." The larva is listed by Dr. Felt as occurring in oak, while Dr. Fisher here records the larva from hickory. During the summer of 1929 a single female specimen of a buprestid species was taken on the trunk of a beech tree in Flushing; it was subsequently determined by Dr. W. S. Fisher of the U. S. National Museum as *Xenorhipis brendeli* Lec. In Dr. Fisher's reply letters he mentions that the National Museum has specimens from Texas and South Carolina, and material reared from dead hickory limbs collected in North Carolina. These localities give some idea, when supplemented with Illinois as mentioned in Blatchely's *Coleoptera of Indiana*, of the interesting and wide range of the species. The Flushing specimen here recorded is now in the collection of the U. S. National Museum.—K. W. COOPER, Flushing, L. I.

NOTES ON THE EPHEMERID GENUS
LEPTOPHLEBIA.

BY EVA L. GORDON, Cornell University, Ithaca, N. Y.

These notes are based on a study of the species of *Leptophlebia* found in eastern United States, particularly in the region about Ithaca, New York. When this study was begun, scarcely an American species of the genus was known in all stages of its life cycle. My work on the group involved especially the association of the immature and mature forms of the local species and observations on their habits. The work of F. P. Ide, in Ontario, during the summers of 1928 and 1929, resulted in the publication (Can. Ent. 62: 204-213, 1930) of descriptions of the nymphs and notes concerning several of the species involved in my study. These notes, therefore, will supplement this previously published information.

The studies of Dr. Paul R. Needham at Cornell University indicate that the genus is of considerable importance as fish food. Quantitative studies of the insect life in selected areas of the hill streams about Ithaca showed that 14.63 per cent of the 5,201 Mayfly nymphs taken during two summers' work belong to the genus *Leptophlebia*. Only the genera *Ephemerella* and *Baetis* were more abundant. In rapid water bottoms Mayflies constituted the largest single food element taken, while in pool bottoms they were second only to Dipterous larvae and pupae (Needham, 1927, p. 197); in stream drift (defined as including all forms of available food, both plant and animal, carried by the current), Mayflies made up 28.94 per cent of the total, being second only to Diptera in abundance. Studies of trout stomachs, made by the same authority (Needham, 1928, p. 224, 225), showed that Mayflies formed 29.70 per cent of all food consumed, being the "most available food" and "consumed by trout more than any other food."

Nymphs of the genus *Leptophlebia* were found chiefly in shallow, moderately swift riffles, eight inches or less in depth, over a bottom of loose stones, with almost no vegetation of any considerable size, but with a slippery coating of algae usually present on the stones. They were found also in regions of quieter water where the more gravelly, sometimes somewhat muddy, bottom was covered thickly with leaf-drift; and in situations where the depth of water was as much as two feet. Grassy stream borders, where comparatively coarse vegetation grew partly

in the water were also populated by *Leptophlebias*; they were often found in tufts of moss and submerged vegetation on stream bottoms. They were taken from areas where the banks were low and the water almost unshaded, as well as from well-shaded woodland and gorge streams. Width of streams where collections were made ranged from four or five feet to twenty or more. No one of the species studied appeared to be restricted closely to any one type of environment.

Imagos of the species studied seem to emerge in a fairly definite succession, although the time of emergence of any given species varied in different streams and seasons, and the seasons for several species overlap. The length of the period of emergence apparently varies from a few days to several weeks. Mating swarms observed differed enormously in size, but without exception appeared between noon and early evening. The genus is diurnal. The height of the season of emergence apparently is passed by the first of August except in the case of *L. debilis*. The eggs of the local species are very similar, and all are of the type shown in figure 2, plate 3. The insects evidently winter either in the egg stage or as partly grown nymphs.

Collecting and rearing.—Collections were made during 1929, 1930 and 1931, in streams within a radius of about twenty-five miles of Ithaca. In Fall Creek, which borders the Cornell University campus on the north, collections were made at various points between the campus and Freeville, about eight miles northeast of Ithaca. Collecting was done in Cascadilla Creek, to the south of the campus, over a distance of about three miles. Further collecting was done in Salmon Creek, ten miles northeast of Ithaca; in The Glen, a spring-fed Ithaca stream; near Harford, which is about thirteen miles east of Ithaca, in the East Branch of Owego Creek, a part of the Susquehanna drainage; in Six Mile Creek, south of Ithaca; in Slaterville Wild Flower Preserve, ten miles to the southeast; in North Spencer stream, fifteen miles to the south; in Enfield Glen, seven miles to the south; in Coy Glen, three miles southwest, and in Van Buskirk's Creek, twelve miles in the same direction; in Taughannock Creek, ten miles to the northwest; and in a small stream near Watkins, about twenty-five miles to the southwest.

The nymphs were collected by means of a small hand screen, separated according to species and locality, and placed in cages for rearing. Rearing was carried on first under nearly natural conditions in a small spring-fed pool and later in wooden troughs, set up in a pumphouse on the shore of Beebe Lake, and

supplied with running water pumped from Fall Creek. Cages of fine meshed wire netting were used for rearing many of the nymphs, although oval cylinders about fourteen inches long, and seven inches in their greater diameter, made of silk bolting cloth on a framework of aluminum wire, proved more satisfactory. The cages were placed obliquely in the water with their upper portions extending well above the water level, thus offering an easy slope up which the subimagos could crawl when they emerged. The cages were visited once and often twice a day so that subimagos might be removed as soon as possible. The subimagos were placed in paper bags, labelled with the place and date of collection, and the date and approximate time of emergence. These bags were hung up in a moist atmosphere and left until the subimaginal molt had been made. The rough surface of the bags provided a satisfactory support to which the insects could cling while they worked themselves out of the subimaginal skin. This method permitted specimens of nymphal and adult stages of the species reared to be secured, together with observations on the length of time required for the subimaginal molt. This ranged from twelve to seventy-two hours, but was most commonly about forty-eight hours.

Specimens were kept in 70 per cent alcohol or mounted in Canada balsam. Mouthparts of nymphs and genitalia of male adults were boiled for a minute in a ten per cent solution of caustic potash before being mounted. Wings were mounted dry, under a cover glass secured to a slide by two strips of gummed paper. In addition to personal collections, material for study was found in the Cornell University collection. I am indebted to Dr. J. McDunnough, of Toronto, for specimens of several species, of both eastern and western forms.

The Species—Twenty-one of the twenty-four known species in the genus *Leptophlebia* are found in North America. Ten of them are found in eastern North America: *L. adoptiva* McD., *L. debilis* Walk., *L. guttata* McD., *L. johnsoni* McD., *L. moerens* McD., *L. mollis* Hag., *L. praepedita* Etn., *L. volitans* McD., *L. ontario* McD., and *L. assimilis* Bks. The first eight of these are the major concern of this paper, since all of them have been recorded in northeastern United States. Six of these species have been reared by me during the past two years. Adults of *L. volitans*, *L. johnsoni*, and *L. ontario* have been available for examination. The specific differences among adults of these nine forms and of nymphs of seven of them are here summarized in keys and tables. The latter are based on study of the species

reared except in the case of *L. volitans*, characters of which were taken from the description by Ide (1930, p. 207).

KEY TO MALE IMAGOS OF NINE NORTHEASTERN AMERICAN
SPECIES OF LEPTOPHLEBIA

- a. Middle segments of abdomen conspicuously pale whitish
 - b. Basal segment of forceps conspicuously enlarged at base
 - c. Segments 3-6 pale whitish with narrow brown band posteriorly *L. moerens*
 - c. Segments 2-7 pale whitish, grayish posteriorly *L. debilis*
 - b. Basal segment of forceps not conspicuously enlarged at base
 - c. Segments 2-7 pale
 - d. No black markings in spiracular area of pale segments *L. mollis*
 - d. Distinct black dot in spiracular area of each pale segment
 - e. Legs pale, tinged with brownish, dark spot at junction of tibia and femur *L. guttata*
 - e. Legs uniform brown, the foreleg deep brown, 2nd and 3rd pale golden *L. johnsoni*
 - c. Segments 3-7 pale, with narrow brown posterior bands *L. volitans*
 - a. Middle segments of abdomen not conspicuously pale whitish
 - b. Penial lobes distinctly shorter than basal segment of forceps
 - c. Penes with triangular, wing-like appendages; second segment of forceps enlarged on the inner side *L. adoptiva*
 - c. Penes with cylindrical hook-like appendages; second segment of forceps not enlarged on the inner side *L. ontario*
 - b. Penial lobes as long or longer than the basal segment of the forceps; penes with slender, cylindrical appendages *L. praepedita*

KEY TO FEMALE IMAGOS OF EIGHT NORTHEASTERN AMERICAN
SPECIES OF LEPTOPHLEBIA¹

- a. Seventh abdominal segment distinctly prolonged ventrally into an ovipositor *L. praepedita*
- a. Seventh abdominal segment not distinctly prolonged ventrally into an ovipositor
 - b. Excavation of 9th sternite plainly more than $\frac{1}{2}$ length of plate

¹ The female of *L. volitans* is undescribed.

- c. Legs whitish, tinged with brown
 - d. Femora distinctly brown, darker beyond the middle, lobes of 9th sternite broad and blunt *L. debilis*
 - d. Femora faintly brown, a distinct brown spot at junction of tibia and femur; lobes of 9th sternite narrow and pointed *L. guttata*
- c. Legs uniform light brown *L. moerens*
- b. Excavation of 9th sternite not more than $\frac{1}{2}$ length of plate
- c. Legs pale whitish *L. mollis*
- c. Legs brown
 - d. Fore-wing less than 7 mm.; hind-wing about 1.5 mm. *L. ontario*
 - d. Fore-wing 7 mm. or more; hind-wing 2 mm. or more
 - e. Excavation of 9th sternite a shallow rounded notch, lobes pointed *L. johnsoni*
 - e. Excavation of 9th sternite broadly U-shaped, well rounded at bottom, lobes rounded ... *L. adoptiva*

KEY TO NYMPHS OF SEVEN NORTHEASTERN AMERICAN
SPECIES OF LEPTOPHLEBIA

- a. Main tracheae of gills with conspicuous branches; lateral spines on segment 9 only
 - b. Color pale brown; canines of mandibles not strongly directed inward, a line along upper edge of molar surface passing through bases of canines *L. adoptiva*
 - b. Color uniform dark brown; canines of mandibles strongly directed inward, a line along upper edge of molar surface passing well below bases of canines *L. mollis*
- a. Main tracheae of gills without conspicuous branches
 - b. Well-developed lateral spines on segment 9 only; second and third joints of maxillary palp $1\frac{1}{2}$ times the length of the first *L. guttata*
 - b. Well-developed lateral spines on segments 8 and 9; second and third joints of maxillary palp about equal the length of the first
 - c. Legs pale, barred with darker brown *L. debilis*
 - c. Legs uniform brown or nearly so
 - d. Gills hairy *L. volitans*
 - d. Gills not hairy
 - e. Segments of abdomen nearly twice as wide as long; spines on 8 and 9 equal *L. moerens*
 - e. Segments of abdomen nearly equal in length and width; spine on 9 longer than on 8
L. praepedita

TABLE I
Characters of Male Imagoes of Nine Northeastern American Species of Leptophlebia

SPECIES	MEASUREMENTS					COLOR AND MARKINGS OF LEGS	PALE SEGMENTS OF ABDOMEN	SPIRACULAR MARKINGS
	Body	Tails	Fore-wing	Hind-wing	Fore-leg			
<i>adoptiva</i>	7-9	9	7-8	2.2 —	7- 7.5	Uniform deep brown	None; anterior portions of 4-7 faintly pale	Trace of broken line on 4-7
<i>debilis</i>	8- 8.5	11	8	2.5 1.8	8.5 —	Light brown; uniform or with dark, proximal spot on tibia	2-7; tips of dorsal and sometimes ventral grayish	Faint broken brown line on 2-7
<i>guttata</i>	6	9	6.5	2.2 1.8	9.5 6.5	Pale, tinged with brownish; dark spot at junction of tibia and femur	2-7; slightly soiled with brownish	Distinct row of black dots posteriorly
<i>johnsoni</i>	7.5- 8.5	22	8.2	2.7	9- 10	Light brown; tarsi whitish; often dark proximal spot on tibia	2-7; 2 tinged with pale brownish	Small black dots below faint brown shades
<i>moerens</i>	6	7	6	1.5	6	Dirty-white; coxae brownish	3-6; narrow brown band posteriorly	Broken brown line usually obsolescent
<i>mollis</i>	7	11	7	2	7- 7.3	Light brown; tarsi paler	2-7; joinings, especially dorsally, yellowish white	None
<i>ontario</i>	6	7	6	1.4	6	Pitch-brown; fore femora darker	None; median segments very narrowly paler anteriorly	None
<i>praepedita</i>	6-7	11	6-7	1.6	6	Dull whitish	None; abdomen lighter brown than thorax	None
<i>volitans</i>	5-6	9	8.5	1.6	6		3-7; 7 tinged with brown; narrow posterior bands	Short lateral longitudinal blackish dashes

TABLE II
Characters of Female Imagos of Eight Northeastern American Species of Leptophlebia

SPECIES	MEASUREMENTS					COLOR AND MARKINGS OF LEGS	NINTH STERNITE
	Body	Tails	Fore-wing	Hind-wing	Fore-leg		
<i>adoptiva</i>	8-8.5	7	7-8	2.3 — 2.6	3.5	Deep amber brown; uniform	Excavation $\frac{1}{2}$ length of plate, broad, well-rounded at bottom; lobes round
<i>debilis</i>	8-8.5	8	8	1.8 — 2.4	5-6.2	Pale; femora distinctly brown, darker beyond middle	Excavation more than $\frac{1}{2}$ length of plate; deeply U-shaped; lobes broad and blunt
<i>guttata</i>	6	6-7	6.5	1.8	3-3.5	Pale whitish-brown, darker on femora	Deep, narrowly U-shaped excavation; lobes pointed
<i>johnsoni</i>	7	12	8-8.5	2.7	5.5	Paler brown than body	Excavation less than $\frac{1}{2}$ length of plate, rounded; lobes pointed
<i>moerens</i>	7	7	7	1.8	5	Uniform light brown, or with dark spot proximally on tibia	Broadly triangular excavation, lobes and excavation equal
<i>mollis</i>	7	4	7.5 — 8	2	3.5	Whitish, faintly discolored at base of femora	Fairly broadly U-shaped excavation, less than $\frac{1}{2}$ length of plate; lobes bluntly pointed
<i>ontario</i>	6		6.5	1.4	4.2	Light brown, tarsi somewhat paler	Excavation not more than $\frac{1}{2}$ length of plate; rounded notch and lobes
<i>praepedita</i>	6-7	9	7	1.6	4.5	Uniform pitch brown	Broadly triangular excavation, not more than $\frac{1}{2}$ length of plate; lobes pointed

TABLE III
Characters of Nymphs of Seven Northeastern American Species of Leptophlebia

SPECIES	SIZE	HEAD	ABDOMEN	LEGS	GILLS
<i>adoptiva</i>	Body, 8-10 tails, 8	Pale areas in front of median ocellus and lateral to lat- eral ocelli	Narrow median pale line nearly to posterior border; pair of anterior pale diverging submedian dashes; stout spine on 9	Pale brown	Main trachea dividing $\frac{3}{8}$ to $\frac{1}{2}$ distance from base; tracheal branches pres- ent; hairy
<i>debilis</i>	Body, 7-8 tails, 9-11	Uniformly brown	Numerous large, variable pale areas; spines on 8 and 9	Pale brown banded with dark	Main trachea dividing 1/10 distance from base; no tracheal branches; not hairy
<i>guttata</i>	Body 6.5-7 tails, 7.5, median longer	Uniformly brown	Indistinct pale median line on 8-10; blackish dashes at bases of gills; spine on 9	Pale	Main trachea dividing 1/10 distance from base; no tracheal branches; not hairy
<i>moerens</i>	Body 7.5-8, tails 5-6	Pale areas in front of median ocellus, lateral to lateral ocelli; pale median line	Small submedian and larger lateral pale areas on each segment; large U-shaped area on 7; spines on 8 and 9	Pale brown lighter at distal end of femur	Main trachea dividing 1/7 to $\frac{1}{8}$ distance from base; no tracheal branches; not hairy
<i>mollis</i>	Body, 6.5- 7.5, tails, 4.0- 4.5	Pale area between ocelli, and one in front of each ocel- lus	Usually uniform brown; traces of pale median and submedian areas; spine on 9	Pale, some- times brownish	Main trachea dividing 2/7 to 1/3 distance from base; tracheal branches present; hairy
<i>praepedita</i>	Body, 6.5, tails, 6-7	Very narrow me- dian pale line	Lateral pale areas on 3- 9, median pale areas, larger in female than in male; short spine on 8, long on 9	Pale brownish, paler at sutures	Main trachea dividing 1/10 distance from base; no tracheal branches; not hairy
<i>volitans</i>	Body, 6.5, tails, 3.5	Pale areas over ocelli, between eyes and on epicranial suture	Pale posterior median and anterior submedian areas on 3-7; spines on 8 and 9	Pale, pro- thoracic legs darker	Main trachea dividing 1/7 distance from base; no tracheal branches; hairy

Descriptions and notes.—Herewith I offer descriptions of hitherto undescribed stages of the six species reared by me, and notes on ecology and life history.

Leptophlebia adoptiva McDunnough.

Subimago:

Male.—Head dark brown. Thorax brown with light tan median line and similar light submedian patches on the meta-thorax; wings pale smoky gray, plainly ciliate on the anal margin; legs deep brown. Abdomen nearly uniform dark brown, often showing traces of the median pale line and the pair of submedian pale dashes diverging from the median line at the anterior border of each segment which were evident in the nymph; tails, dull brown, hairy. Length of body 7 mm.; of fore-wing, 7 mm.; of hind-wing, 2.4 mm.; of tails, 7 mm.; of foreleg, 5 mm. The genitalia are similar in form to those of the adult; the forceps show the inwardly broadened second segment and the rather abrupt, distinct enlargement on the inner side at the base of the first segment.

Female.—Similar to the male in coloring, but of redder cast. Length of body, 8 mm.; of fore-wing, 7 mm.; of hind-wing, 2.4 mm.; of tails, 7 mm. The excavation of the sub-anal plate is like that of the adult.

This species reaches maturity earlier in the spring than any other taken in the Ithaca region. In 1930, well-grown nymphs were collected in Salmon Creek as early as March 16. The earliest collection in 1931 was April 11, the last, May 5. On the latter date only a very few nymphs were collected, where the species had been abundant on April 19. Both imagos and subimagos were taken in flight on May 5, 1931. On June 17, neither nymphs nor adults could be found. A number of nymphs of this species were reared in pans in the laboratory, being kept alive for more than a month in quiet water, on a diet of *Elodea*, rubbed to a pulp on a coarse file. The length of the subimaginal stage varied from 24 to 48 hours. Half-grown nymphs were collected in Salmon Creek, Nov. 23, 1930. There is probably only one brood a year.

Leptophlebia debilis Walker.

Subimago:

The very brief description of the subimago given by Eaton (1883-88, p. 97: *L. mollis*), which may pertain to either *L. debilis* or *L. mollis* may be amplified as follows:

Male.—General color dark reddish brown; mesothorax bordered with darker. Wings dull grayish white, margined

with very fine short hairs. Legs pale whitish, the foreleg about 5 mm. long. Abdomen lighter in the middle segments; genitalia and tails pale whitish; dilation of the forceps limb at the base very similar to that of the imago. Length of body, 6.5 mm.; of fore-wing, 7.5 mm.; of hind-wing, 2 mm.; of tails, 7 mm.

Female.—Similar in color to the male, but the abdomen uniform reddish brown. Excavation of the subanal plate narrow and deep, rounded at the bottom; apices of the divisions narrowly rounded.

During the seasons 1929 and 1930 this species was collected in only one locality, The Glen, Ithaca. The species matured late, well-grown nymphs having been collected on September 26, and adults taken in flight October 31 and November 1, 1929. The specimens taken slightly exceeded Eaton's measurements (which were of dried specimens), averaging about 7.5 mm. in body length; tails of the female, 8 mm. The species is widely distributed through North America. A study of the dates on which adults were taken, especially in the New York State region suggests a succession of life cycles similar to that discovered by Murphy for *Baetis posticus* (Murphy, 1922, p. 41, 42): a six-month's cycle, May to October; a nine month's cycle, October to August; a nine month's cycle, August to May. Recorded dates of emergence of adults of *L. debilis* include May 17-28; August 1-September 3, and October 31-November 1.

Taxonomic confusion involving *L. debilis* and *L. mollis* necessitates mention of the fact that the *L. mollis* of Needham (1907, p. 189), and of Morrison (1919, p. 143) is really *L. debilis*. The same may be true of other early published mention of the species. Eaton's Monograph gave the name *L. debilis* Walker to a species described from a female taken in Nova Scotia. McDunnough (1925-1, p. 169), reported the collection of a similar female "on the same day (August 22), at the same locality as a male which is evidently *separata* Ulmer," and regarded it "as without doubt the female of *L. separata*, which name will fall therefore as a synonym of *debilis*." The *L. mollis* described by Eaton in 1871 and in 1884 (1871, p. 88; 1883-88, p. 97) were shown by Ulmer (1921, pp. 254-256) to have been two different species, the two descriptions having been made from different specimens. Consequently he restricted the type of the species to the specimen described by Eaton in 1871, designating the *L. mollis* of the Monograph as *L. separata*. This last name yielded to *L. debilis* as a result of the work of McDunnough referred to above.

Leptophlebia guttata McDunnough.*Imago:*

To the descriptions of McDunnough (1924, p. 95; 1925-2, p. 209) may be added measurements of the imagos:

Male.—Length of body, 6 mm.; of fore-wing, 6.5 mm.; of hind-wing, 1.8 mm.; of tails, 9 mm.; of foreleg, 6.5 mm.

Female.—Length of body, 6 mm.; of fore-wing, 6.5 mm.; of hind-wing, 1.8 mm.

Subimago:

Male.—Very much like the adult in general color except for the abdomen, which is uniform reddish brown, and the wings, which are distinctly smoky gray. The penes appear as two imperfectly separated broad-tipped appendages.

Female.—Much like the male in coloring. Excavation of subanal plate more broadly U-shaped than in the imago.

Nymphs of this species were collected, though never abundantly, in many streams near Ithaca, and are represented in collections from West Virginia and Pennsylvania. In the Ithaca region they were almost always found associated with *L. mollis*, except in the latter part of the season, indicating that their period of emergence is somewhat later than that of *L. mollis*. Well-grown nymphs were collected in Fall Creek, at Watkins, and in Enfield Glen on dates ranging from May 30 to June 7, 1930, reared adults appearing about the middle of June. A number of adults were reared from a catch at Salmon Creek, July 6, 1930. The earliest, and largest, swarm of adults was observed over Taughannock Creek, June 16, 1931; adults were taken swarming over Cascadilla Creek, July 17, 1930; subimagos and imagos were collected at Slaterville, July 27, 1930. The period of emergence is therefore fairly long, although the fact that only a very few mature nymphs were collected after July 27 indicates that the end of that month probably marks its termination.

Leptophlebia moerens McDunnough.*Subimago:*

Male.—General color, light red-brown. Length of body, 6 mm.; of fore-wing, 6.5-7 mm.; of hind-wing, 1.6 mm.; of tails, 7 mm.; of foreleg, 5.8 mm. Head light brown. Thorax dark red brown; legs pale brown, darker at the proximal ends of the tibiae; wings gray-brown, with short, fine hairs on the anal margin. Abdomen, red-brown dorsally, darker at the joinings of the segments, the middle segments slightly lighter in color; paler ventrally. Adult characters of the

genitalia fairly well developed, especially the excavation between the penial lobes; tails pale gray-brown, with circlets of hairs at the joinings of the segments.

Female.—General color red-brown, slightly darker than the male. Length of body 6 mm.; of fore-wing, 7 mm.; of hind-wing, 1.6 mm.; of tails, 7 mm. The female is much like the male in color and markings except that the middle segments of the abdomen are not lighter in color. Subanal plate with a shallow broadly rounded excavation.

Nymph:

General color light brown. Length of body, 7.5–8 mm.; of tails, 5–6 mm. Head red-brown, the vertex paler and pale areas in front of the median ocellus and lateral to the lateral ocelli, also a median pale line; antennae pale brown, with a darker second joint; mouthparts pale brown, the labrum shallowly notched anteriorly. Pronotum with light margins; legs pale brown, slightly lighter at the distal ends of the femora. Abdomen light brown, each segment with a small pair of submedian pale areas and a larger pair of lateral pale areas; segment 7 with a large U-shaped postero-median pale area which is confluent with the submedian dashes; lateral spines present on segments 8 and 9; tails pale brown, with few short hairs. Gills with the main tracheae branching $1/7$ to $1/8$ of the distance from the base to the tip of the gill; main tracheae without conspicuous branches.

Near Ithaca, nymphs of this species were taken in greatest abundance at The Glen, but also from Cascadilla Creek, Six Mile Creek, and Gyrinophilus Spring near McLean. Since most of the rearing of this species was carried on under almost natural conditions the dates of emergence of reared adults probably are close to the normal for the species. The first subimago to emerge in 1929 appeared June 26, and adults continued to emerge throughout July. In 1930, the first collection of nymphs was made June 2, the adults transforming June 6–15. The recorded duration of the subimaginal stage varied from about fifteen hours to over 36 hours. No large swarms of the species were observed during either summer, and I was unable to verify McDunnough's suggestion (1925–2, p. 209) that the species may be double-brooded.

Leptophlebia mollis Hagen.

Imago:

Female.—Eaton (1871, p. 88) gave a very brief description of the female. A more complete description, from reared specimens taken at Etna, May 30, 1930, is included here: General color, red-brown with pale whitish appendages.

Length of body, 7 mm.; of fore-wing, 7.5 mm.; of hind-wing, 1.9 mm.; of tails, 4 mm. Head red-brown, darker than the remainder of the body. Thorax dark red-brown above, lighter below; legs pale whitish, faintly colored with brownish at the bases, especially on the forelegs, which are 3.5 mm. long; wings hyaline, with slight iridescence, the veins almost colorless. Abdomen nearly uniform red-brown, slightly lighter at the joinings; tails pale whitish; excavation of the subanal plate narrowly U-shaped, less deep than in the similar *L. guttata*; the apices of the lobes bluntly pointed.

Subimago:

A more complete description of both male and female than is given by Eaton (1871, p. 88), from specimens taken at Enfield Glen, June 7, 1930, and from Etna, May 30, 1930, follows:

Male.—General color red-brown. Length of body, 6.5 mm.; of fore-wing, 6.5–7 mm.; of hind-wing, 1.5–1.7 mm.; of tails, 6 mm.; of foreleg, 4 mm. Head red-brown, the eyes less brightly orange-brown than in the adult. Thorax red-brown; legs very pale brownish white; wings, pale brownish gray, the fringe of hairs on the anal margin short and fine. Abdomen red-brown, segments 2–7 somewhat paler; genitalia pale brownish white, much like those of the adult (see fig. 3, plate XIV), the second segment somewhat enlarged inwardly, but the base of the first segment less enlarged than in the imago; tails, whitish.

Female.—General color red-brown. Length of body, 6 mm.; of fore-wing, 6.5–7 mm.; of hind-wing, 1.5 mm.; of tails, 6 mm. The female is much like the male in color except that the abdomen is darker and uniform in color. The excavation of the subanal plate is much like that of the imago.

Thirteen localities are represented in my collections of this species, which is apparently the commonest member of the genus in this region. Well-grown nymphs were collected from the middle of May through the first week in June, both in 1930 and in 1931. Reared adults from collections made May 14, 15 and 16 appeared first May 29; subimagos were emerging in numbers in Fall Creek at Etna and in Enfield Glen, when collections were made May 30 and June 7, 1930. That the height of the transformation season, at least in some streams, occurs early in June is indicated by the fact that only a very few mature nymphs were taken from the brook at North Spencer on June 5, and from Cascadilla Creek southwest of Turkey Hill on June 8, although both localities had yielded abundant catches shortly before those dates.

Available dates of capture of imagos and dates of emergence of reared specimens all fall within the month of June, for the Ithaca region. The species seems to be single-brooded. Large swarms have been recorded as late as June 26, but the period of emergence seems to extend over most of that month. The length of the subimago period varied from 24 to 72 hours, but in the majority of cases observed was about 48 hours.

The taxonomic history of this species is bound up with that of *L. debilis*, which was discussed briefly in this paper.

Leptophlebia praepedita Eaton.

Imago:

Male.—Eaton's description (1883-88, p. 99) was made from a dried specimen. The general color, in fresh specimens, is red-brown, the head and thorax darker. Length of body, 6 mm. (instead of 5 mm., according to Eaton); of fore-wing, 6-7 mm.; of hind-wing, 1.6 mm.; of tails, 11 mm.; of foreleg, 6 mm.

Female.—General color like that of the male. Length of body, 6 mm.; of fore-wing, 7 mm.; of hind-wing, 1.6 mm.; of tails, 9 mm. Head and thorax dark red-brown; legs uniform red-brown, the fore femora slightly darker than the other segments and than the other legs; foreleg, 4.5 mm.; wings hyaline, with a faint bronzy tint. Abdomen uniform red-brown, lighter than the rest of the body; tails light red-brown; posterior margin of 7th sternite prolonged distinctly, serving as an ovipositor.

Subimago:

A dried specimen is described by Eaton (1883-88, p. 99) as "Wings sepia-grey, with pitch-brown neuration. Setae sepia-brown."

Male.—General color, dark sepia-brown. Length of body, 6 mm.; of fore-wing, 6.5-7 mm.; of hind-wing, 1.6 mm.; of tails, 8-9 mm.; of foreleg, 5 mm. Wings dull gray-brown, the hind margins distinctly hairy; legs, much like those of the adult, deep, uniform sepia-brown; genitalia distinctly like those of the imago in form and color, but clothed with hairs; tails, deep sepia-brown, hairy.

Female.—General color, wings, legs and tails like the male. Excavation of the subanal plate V-shaped, extending a little more than half the length of the sternite; caudad elongation of 7th sternite, the ovipositor, almost as in the imago. Length of body, 6 mm.; of fore-wing, 7 mm.; of hind-wing, 1.6 mm.; of tails, 8 mm.; of foreleg, 4.5 mm.

This species was taken from Six Mile Creek, from North Spencer stream, from Fall Creek, and from Owego Creek at Harford. Well-grown nymphs were collected between the dates May 14 and June 5, 1930, only a few individuals being found on the latter date, in the North Spencer stream, where shortly before they had been abundant. Since all recorded dates of capture of adults in the Ithaca region fall in late May or in early June, it is probable that the species is single-brooded. Reared specimens showed a variation between 24 and 48 hours for the subimago stage.

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EXPLANATION OF PLATES.

PLATE XII, WINGS AND GENITALIA OF IMAGOS.

- Figure 1. *Leptophlebia adoptiva*.
Figure 2. *Leptophlebia debilis*.
Figure 3. *Leptophlebia guttata*.
Figure 4. *Leptophlebia johnsoni* (genitalia of male after McDunnough, 1924-2, p. 73).
Figure 5. *Leptophlebia moerens*.
Figure 6. *Leptophlebia mollis*.
Figure 7. *Leptophlebia ontario*.
Figure 8. *Leptophlebia praepecta*.
Figure 9. *Leptophlebia volitans*.
a. Wings of Male.
b. Ninth Sternite of Female (except 9b).
c and d. Genitalia of Male, lateral and ventral aspects (b and c in 9).
8e. Segment 7 of female, *L. praepecta*, showing ovipositor.

PLATE XIII, GILLS AND MOUTHPARTS OF NYMPHS.

- Figure 1. *Leptophlebia adoptiva*.
Figure 2. *Leptophlebia debilis*.
Figure 3. *Leptophlebia guttata*.
Figure 4. *Leptophlebia moerens*.
Figure 5. *Leptophlebia mollis*.
Figure 6. *Leptophlebia praepecta*.
a. Labrum.
b. Hypopharynx.
c. Maxilla.
d. Left and Right Mandibles.
e. Labium.
f. Gills from Segments 1, 4, and 7.

PLATE XIV.

- Figure 1. Head of Female Nymph of *Leptophlebia moerens*.
Figure 2. Eggs of *Leptophlebia moerens*.
Figure 3. Genitalia of Male Subimago, *Leptophlebia mollis*.



1 adoptiva 2 debilis 3 guttata 4 moerens 5 mollis 6 praepedita

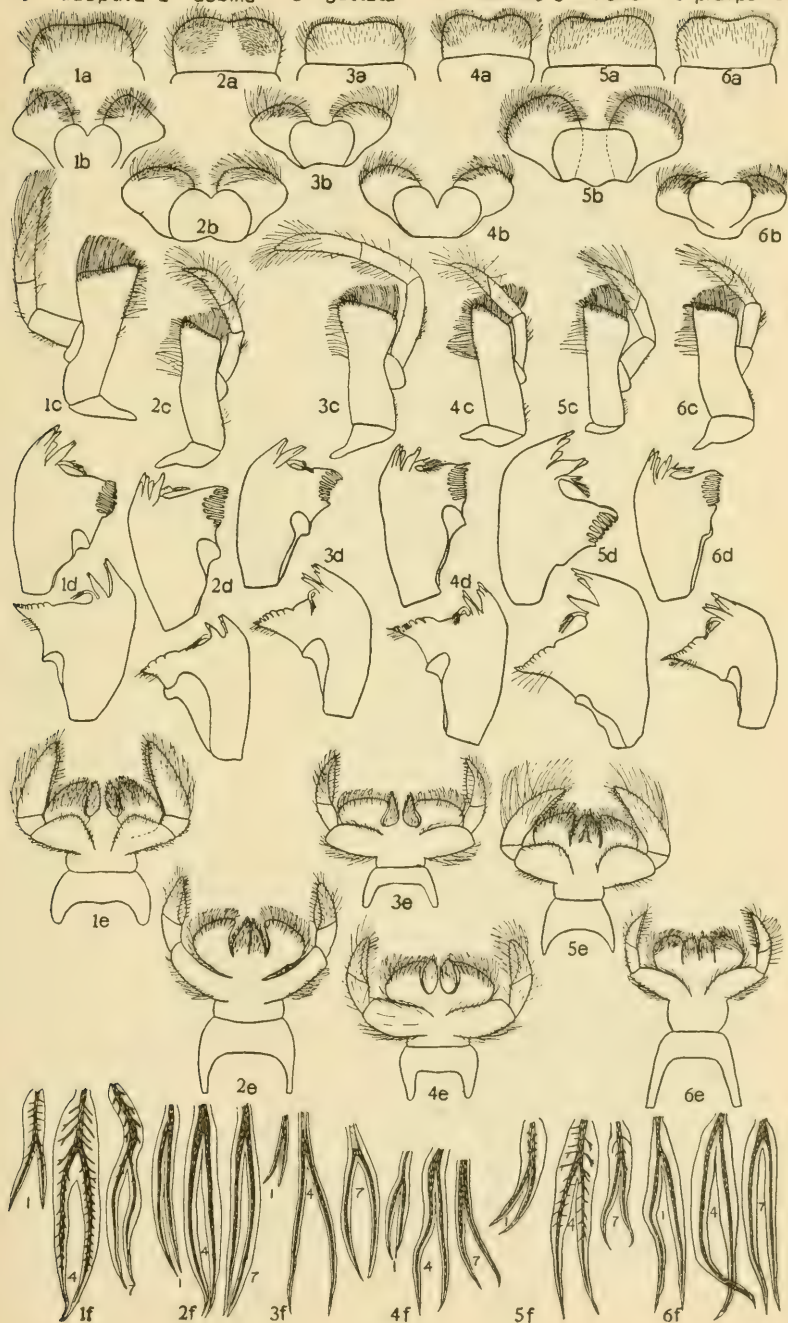




Figure 1



Figure 2



Figure 3

THE MALE OF NOTONECTA COMPACTA HUNGERFORD.

BY H. B. HUNGERFORD, Lawrence, Kansas.¹

Notonecta compacta Hungerford was described in the Canadian Entomologist, Volume LVII, pp. 239-240, 1925, from four females. I have just received twenty specimens of this species from Guerrero, Mexico. In this lot there are sixteen females and four males. Eight of the females are red and black as was one of the paratypes. The four males are marked like the dark females but are slightly larger. One of these I am designating the Allotype and the other three as Paraallotypes. In the male the head is slightly more than half the length of the pronotum on its median line; the vertex slightly longer than its anterior width. Lateral margins of the pronotum divergent, moderately constricted; anterior angles embracing the eyes (in both sexes); anterior portion of the lateral ledge broader than elsewhere but not interrupted. (It is interrupted in female.) Anterior trochanter of male with a broad blunt hook. Penultimate abdominal sternite enlarged. The genital capsule is plump and the clasper is thick and triangular with distal base broadly produced. While the lateral margins of the prothorax are less constricted than in the female they are more constricted than in the male of any other species known. It is now possible to state that the male specimen named *N. mexicana* by Champion in his B. C. A. paper and labeled "Amula, Guerrero, 6,000 ft., H. H. Smith" is *N. compacta* Hungerford.

Notice to Authors.—Minor notes to fill such space as this are needed. Longer articles cannot be assured prompt publication.
—Editor.

¹ Contribution from the Department of Entomology, University of Kansas.

BOOK NOTES

In Days Agone, by W. S. Blatchley; pp. 1-338, pls. I-XVI. (The Nature Publishing Co., 1558 Park Avenue, Indianapolis, Ind.; \$2, plus postage from Indianapolis).

Here Dr. Blatchley follows "*My Nature Nook*" by a more extensive work on his hunting grounds in primitive Florida, before the real estate bubbles, (now deflated) cut up lake and swamp, hammock and forest into city lots and orange groves in the midst of muck and sand.

This work is really the progressive story of how our wildernesses have vanished before the crest of the wave of "progress," a wave about as constructive as a tidal wave.

Dr. Blatchley secured a home by the sea in Dunedin; within a few short years, it was in the middle of a city, with paved streets and vacant lots; the pleasant trees and the lovely flowers were replaced by weed-grown plots.

On the other hand, before all this destruction came to pass, he had seen and enjoyed primitive Florida, its lakes and rivers, its forests and swales, peopled by animals, birds and insects. His narrative, in the form of excerpts from his diary, begins on January 9, 1901, and closed on March 30, 1922—twenty-one years of observation and study.

Essentially a naturalist, Dr. Blatchley deals with living things as elements of that phenomenon of nature of which man is a part; therefore, worthy of his attention and knowledge. We have here no dry catalogue of polysyllables but whole living pages out of the book of nature itself. Here we read about birds, beasts, fishes, insects, as they are in their natural surroundings. In this aspect, Dr. Blatchley's work is a repository of nature lore. He tells of finding rare insects, at times in numbers; how they live, what they eat, where they hide. In fact, any one who wants to know Florida and its wild life as it was and as it is can make no mistake in securing this work. The curious fact about is that while it is a naturalist's diary, it is also a disillusioning picture of that curious recurrent phase of American life, the real estate boom.

J. R. T.-B.

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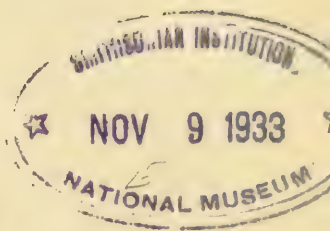
No. 4

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ALABAMA COLEOPTERA NOT GENERALLY LISTED FROM THE GULF COAST STATES EAST OF THE MISSISSIPPI RIVER, FLA., GA., ALA., AND MISS.

By H. P. LÖDING, Mobile, Ala.

In making up a Catalogue of Coleoptera found in the State of Alabama it was noticed that nearly one-sixth of the number were not recorded in Leng's catalogue as occurring in any of the eastern Gulf States and it was thought, that such information might be of interest and value to students of geographical distribution and to taxonomists.

Included in this list are also such species as have been recorded only from a single one of these states, and from no other, and such species in my collection of which Alabama is the type locality.

Unless otherwise designated, all species listed have been collected during the past thirty years either by the author or by his good friend Dr. T. S. Van Aller, or by both, and are at the present time represented with full data in his collection.

Species taken only in the northern half or southern half of the state are designated, respectively, by the letters N or S, all others have been found in both parts.

Where the loan of material has been requested for study or revision the credit for identification is given to such specialist under the family or generic name as the case may be.

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To Dr. Walter B. Jones, Director of the Alabama Museum of Natural History, who for several years has made possible adequate collecting trips into the more remote parts of the State, many thanks are due.

CICINDELIDAE

- | | | | |
|-----|-----------------------------|-----|---------------------------------|
| 108 | <i>Cicindela cuprascens</i> | | Jones collector. |
| | Lec. N. Dr. W. B. | 110 | <i>Cicindela lepida</i> Dej. N. |

CARABIDAE

- | | | | |
|-------|--|-------|--|
| 127a | <i>Scaphinotus heros</i> | 18693 | <i>Evarthrinus lilliputicus</i> |
| | Harr. N. | | Csy. type loc. S. |
| 162 | <i>Sphaeroderus lecontei</i> | 1085 | <i>Eufieromia relicta</i> |
| | Dej. N. | | (Newn.) N. |
| 308a | <i>Pasimachus morio</i> Lec. | 1111 | <i>Gastrosticta amnicola</i> |
| | N. | | Csy. N. |
| 359 | <i>Clivina impressifrons</i> | 1168 | <i>Lophoglossus strenuus</i> |
| | Lec. | | (Lec.). S. |
| 368 | <i>Clivina analis</i> Putz. | 1173 | <i>Omaseus ebeninus</i> Dej. |
| 373 | <i>Clivina ferrea</i> Lec. S. | | S. |
| 432 | <i>Bembidion americanum</i> | 1265 | <i>Bradytus exaratus</i> Dej. |
| | Dej. | | N. |
| 660 | <i>Bembidion variegatum</i> | 1400 | <i>Amara cupreolata</i> |
| | Say. | | Putz. N. |
| 705 | <i>Bembidion affine</i> Say. | 1450 | <i>Dicaelus dilatatus</i> Say. |
| 829 | <i>Tachyura tripunctata</i> | | N. |
| | Say). | 1451 | <i>Dicaelus planicollis</i> |
| 879 | <i>Tachys misellus</i> Laf. S. | | Lec. S. |
| 929 | <i>Myas coracinus</i> (Say). | 1466 | <i>Dicaelus ambiguus</i> Laf. |
| | N. | | N. |
| | <i>Pseudanopthalmus lodingi</i> Valentine. N. | 1468a | <i>Dicaelus angustus</i> Csy. |
| | type loc. | | N. |
| | <i>Pseudanopthalmus alabamiae</i> Valentine. N. | 1473 | <i>Badister maculatus</i> |
| | type loc. Dr. Valentine collector. | | Lec. S. |
| 1067 | <i>Evarthrus sigillatus</i> | 1508 | <i>Platynidius angustatus</i> |
| | (Say). | | (Dej.). |
| | <i>Evarthrus lodingi</i> van Dyke. No type locality. | 1522 | <i>Platynus extensicollis</i> |
| | | | (Say). |
| 1080 | <i>Ferestria obsoleta</i> | 1532 | <i>Platynus sulcipennis</i> |
| | (Say). | | Horn. S. |
| 1083 | <i>Ferestria nanula</i> Csy. | 1556 | <i>Platynus ferreus</i> |
| | S. type loc. | | (Hald). |
| 18692 | <i>Evarthrinus alabamensis</i> Csy. type loc. S. | 1591 | <i>Platynus quadrimaculatus</i> Horn. S. |
| | | 1609 | <i>Atranius pubescens</i> |
| | | | (Dej.). |
| | | 1623 | <i>Zuphium americanum</i> |
| | | | Dej. |

- | | | | |
|-------|---|------|--|
| 1636 | <i>Tetragonoderus fasciatus</i> Hald. | 2024 | <i>Selenophorus fossulatus</i> Dej. S. |
| 1694 | <i>Apristus subsulcatus</i> (Dej.). | 2070 | <i>Triplectrus carbonarius</i> (Say). |
| 1750a | <i>Cymindis mobiliensis</i> Csy. S. type loc. | 2071 | <i>Triplectrus rusticus</i> (Say). |
| 1771 | <i>Helluomorpha texana</i> Lec. N. | 2085 | <i>Cephalogyne lodingi</i> (Schffr.). S. type loc. |
| 1779 | <i>Brachinus medius</i> Harris. | 2088 | <i>Anisodactylus nigerri-mus</i> Dej. |
| 1853 | <i>Chlaenius maxillosus</i> Horn. S. | 2090 | <i>Anisodactylus nigrita</i> Dej. N. |
| 1878 | <i>Geopinus incrassatus</i> (Dej.). N. | 2107 | <i>Anisodactylus coenus</i> Say. |
| 1886 | <i>Cratachanthus dubius</i> (Beauv.). | 2127 | <i>Anadaptus balti-morensis</i> (Say). N. |
| 1897 | <i>Harpalus erraticus</i> Say. N. | 2198 | <i>Stenocellus neglectus</i> (Lec.). S. |
| 1910 | <i>Harpalus erythropus</i> Dej. N. | 2245 | <i>Tachistodes indistinctus</i> (Dej.). |
| 2009 | <i>Harpalus vulpeculus</i> Say. N. | 2251 | <i>Agonoderus lineola</i> (Fab.). N. |
| 2010 | <i>Harpalus dichrous</i> Dej. N. | 2256 | <i>Agonoderus lecontei</i> Chd. N. |

DYTICIDAE

- | | | | |
|------|---|------|---|
| 2359 | <i>Laccophilus fasciatus</i> Aubé. | 2473 | <i>Hydroporus vitiosus</i> Lec. S. |
| 2394 | <i>Bidessus lacustris</i> (Say). S. | 2508 | <i>Hydroporus signatus</i> Mann. |
| 2396 | <i>Bidessus floridanus</i> Fall. S. | 2514 | <i>Hydroporus niger</i> Say. |
| 2449 | <i>Hydroporus lobatus</i> Shp. S. | 2523 | <i>Hydroporus oblitus</i> Aubé. |
| 2452 | <i>Hydroporus clypealis</i> Shp. S. | 2651 | <i>Acilius semisulcatus</i> Aubé. S. |
| 2464 | <i>Hydroporus carolinus</i> Fall. S. | 2654 | <i>Thermonectes ornati-collis</i> (Aubé.). S. |
| 2471 | <i>Hydroporus striato-punctatus</i> Melsh. N. | 2655 | <i>Thermonectes basilaris</i> (Harr.). S. |
| | | 2667 | <i>Cybister fimbriolatus</i> (Say). |

Hydroporus all determined by Fall.

GYRINIDAE (det. Fall)

- | | | | |
|------|--------------------------------------|-------|------------------------------------|
| 2671 | <i>Dineutes vittatus</i> (Germ.). S. | 2687 | <i>Gyrinus aeneolus</i> Lec. S. |
| 2674 | <i>Dineutes discolor</i> Aubé. | 19252 | <i>Gyrinus pachysomus</i> Fall. S. |
| 2682 | <i>Dineutes emarginatus</i> Say. | | |

HYDROPHILIDAE

- 2788 *Derallus altus* (Lec.). 2821 *Paracymus lodingi*
S. (Fall). S. type loc.
2789 *Hydrous triangularis* 2843 *Enochrus reflexipennis*
(Say). (Zimm.). S.
2795 *Hydrophilus obtusatus* Say.

LEPTINIDAE

- 2906 *Leptinus testaceus* Müll. S.

SILPHIDAE

- 2911 *Necrophorus ameri-* 2964 *Ptomaphagus pusio*
canus (Oliv.). N. (Lec.). N.
2918 *Necrophorus pustulatus* 2996 *Anisotoma alternata*
Herschel. N. (Melsh.). S.
2927 *Silpha noveboracensis* 3023 *Leiodes discolor* Melsh.
Forst. N. Dr. Wal-
ter B. Jones collector.

PSELAPHIDAE (determinations by Fletcher)

- 6190 *Batrissodes unicornis* 6320 *Decarthron longulum*
Csy. S. (Lec.). S.
6225 *Nisaxis tomentosa* (Aubé.). S.

SCAPHIDIIDAE

- 6482 *Scaphidium quadrigut-* 6492 *Scaphisoma ornatum*
tatum Say. Fall. S. type loc.
6482d *Scaphidium piceum* 6515 *Baeocera concolor*
Melsh. (Fab.). S.
6487 *Scaphisoma carolinae* Csy.

HISTERIDAE (determinations by Ballou)

- 6605 *Hister orbiculus* Csy. 6734 *Caerosternus americanus*
S. type loc. (Lec.).
6607 *Hister osculatus* Blatch. 6814 *Saprinus obsidianus*
6664 *Phelister sayi* Carn. S. Csy. S. type loc.
type loc. 6836 *Saprinus assimilis*
6670 *Phelister mobiliensis* Payk.
Csy. S. type loc. 6844 *Saprinus convexius-*
6674 *Phelister saunieri* culus Mars. S.
Mars. S. 6864 *Saprinus rubriculus*
6676 *Phelister aeneomicans* Mars. S.
Horn. S. 6879 *Saprinus sparsus* Csy.
6680 *Phelister carnochani* S.
Csy. type loc. 6880 *Saprinus divulsus* Csy.
6896 *Saprinus patruelis* Lec.

LAMPYRIDAE

- 6965 *Pleotomus* sp. ? *davisi* 6997 *Photinus marginellus*
Lec. N. Lec.
6996 *Photinus pyralis* (L.).

- | | | | |
|------|------------------------------|------|---------------------------|
| 6999 | <i>Photinus scintillans</i> | 7034 | <i>Tytthonyx erythro-</i> |
| | (Say). | | <i>cephala</i> (Fab.). S. |
| 7025 | <i>Phengodes sallei</i> Lec. | | |
| | S. | | |

MELYRIDAE

- | | | | |
|------|-------------------------------|------|-----------------------------|
| 7228 | <i>Collops balteatus</i> Lec. | 7305 | <i>Attalus semirubidus</i> |
| | S. | | Fall. S. type loc. |
| 7232 | <i>Temnopsophus impres-</i> | 7306 | <i>Attalus melanopterus</i> |
| | <i>sus</i> Sz. S. | | (Er.). S. |
| 7304 | <i>Attalus pallifrons</i> | | |
| | (Mots.). | | |

CLERIDAE

- | | | | |
|------|-------------------------------|------|-------------------------------|
| 7573 | <i>Lecontella cancellata</i> | 7688 | <i>Isohydnocera longicol-</i> |
| | (Lec.). S. | | <i>lis</i> (Ziegl.). S. |
| 7595 | <i>Enoclerus quadrigutta-</i> | 7717 | <i>Cregya mixtus</i> Lec. S. |
| | <i>tus</i> Oliv. | 7718 | <i>Cregya quadrisignatus</i> |
| | | | Spin. S. |

CUPESIDAE

- | | |
|------|--------------------------------|
| 7743 | <i>Cupes capitatus</i> Fab. S. |
|------|--------------------------------|

OEDEMERIDAE

- | | |
|------|--------------------------------------|
| 7757 | <i>Xanthochroa trinotata</i> Lec. S. |
|------|--------------------------------------|

MORDELLIDAE (determinations by Liljeblad)

- | | | | |
|-------|-------------------------------|------|--------------------------------|
| 7804 | <i>Tomoxia bidentata</i> | 7854 | <i>Mordellistena pallipes</i> |
| | (Say). S. | | Smith. S. |
| 7806 | <i>Tomoxia inclusa</i> Lec. | 7856 | <i>Mordellistena ornata</i> |
| | S. | | (Melsh.). N. |
| 19602 | <i>Mordella atrata</i> Melsh. | 7891 | <i>Mordellistena fuscipen-</i> |
| 7829 | <i>Glipodes sericans</i> | | <i>nis</i> (Melsh.). S. |
| | (Melsh.). S. | 7920 | <i>Mordellistena texana</i> |
| 7841 | <i>Mordellistena limbalis</i> | | Smith. N. |
| | (Melsh.). S. | 7925 | <i>Mordellistena attenuata</i> |
| | | | (Say). S. |

RHIPIPHORIDAE

- | | |
|------|----------------------------|
| 7957 | <i>Macrosiagon lineare</i> |
| | (Lec.). S. |

MELOIDAE

- | | | | |
|------|------------------------------|-------|-------------------------------|
| 7990 | <i>Pomphopoea sayi</i> Lec. | 8024a | <i>Epicauta marginata</i> |
| | N. | | (Fab.). |
| 7998 | <i>Epicauta trichrus</i> | 8033 | <i>Epicauta pennsylvanica</i> |
| | (Pallas.). | | (DeG.). |
| 8018 | <i>Epicauta vittata</i> Fab. | 8041 | <i>Macrobasis torsa</i> |
| | S. | | (Lec.). S. |
| 8024 | <i>Epicauta tinerea</i> | 8149 | <i>Meloë moerens</i> Lec. S. |
| | (Forst.). | 8191 | <i>Nemognatha vittigera</i> |
| | | | Lec. S. |

PYROCHROIDAE

- 8220
- Neopyrochroa flabellata*
- Fab. N.

PEDILIDAE

- 8265 *Stereopalpus vestitus* (Say). N. 8279 *Macratrria murina* (Fab.).
8278 *Macratrria confusa* Lec. N.

ANTHICIDAE

- 8318 *Notoxus calcaratus* Horn. 8351 *Anthicus virginiae* Csy. S.
8325 *Mecynotarsus elegans* Lec. S. 8390 *Anthicus rixator* Csy. S.
8347 *Anthicus formicarius* Laf. S. 8454 *Anthicus pubescens* Laf. S.
8348 *Anthicus cinctus* Say. S.

RHIPICERIDAE

- 8543
- Zenoa picea*
- (Beauv.). 8546
- Sandalus niger*
- Knoch. S.

ELATERIDAE

- 8554 *Adelocera impressicollis* (Say). 8909 *Glyphonyx quietus* (Say). S.
8567 *Meristhus cristatus* Horn. S. 8910 *Glyphonyx inquinatus* (Say). S.
8602 *Conoderus* (*Monocrepidius*) *scissus* (Schffr.). S. 8914 *Glyphonyx mimeticus* (Horn). S.
8609 *Conoderus* (*Monocrepidius*) *bellus* Say. 8959 *Elater manipularis* Cand. S.
Heteroderes fuscus (Blatch.). S. 8991 *Megapenthes angularis* Lec. S.
8624 *Limonius aurifer* Lec. N. 9002 *Anchastus signaticollis* (Germ.).
8663 *Athous acanthus* (Say). N. 9009 *Anchastus fuscus* (Lec.).
8667 *Athous cucullatus* (Say). N. 9012 *Anchastus digitatus* Lec. S.
8717 *Ludius bivittatus* (Melsh.). N. 9014 *Anchastus rufus* Cand. S.
8834 *Hypnoidus choris* (Say). 9023 *Melanotus secretus* (Lec.). S.
8848 *Hypnoidus obliquatus* (Melsh.). 9026 *Melanotus depressus* (Melsh.). S.
8866 *Crignus abruptus* (Say). S. 9042 *Melanotus verberans* (Lec.). S.
8878 *Dolopius lateralis* Esch. N. 9116 *Horiſtonotus exoletus* (Er.). S.
9119 *Esthesopus praeditus* Horn. S.

MELASIDAE

- | | | | |
|------|---|------|--|
| 9127 | <i>Isorhipis ruficornis</i>
(Say). N. | 9155 | <i>Microrhagus audax</i>
Horn. S. |
| 9131 | <i>Poecilochrus errans</i>
(Horn.). S. | 9159 | <i>Microrhagus bonvouloiri</i> Horn. S. |
| 9134 | <i>Deltometopus rufipes</i>
(Melsh.). N. Dr.
W. B. Jones collector. | 9164 | <i>Sarpedon scabrosus</i>
Bonv. N. |
| 9147 | <i>Fornax calceatus</i>
(Say). S. | 9171 | <i>Nematodes collaris</i>
Bonv. S. |
| | | 9174 | <i>Schizophilus subrufus</i>
(Rand.). |

BUPRESTIDAE

- | | | | |
|-------|---|------|--|
| 9349 | <i>Dicerca asperata</i>
(Cast.). | 9491 | <i>Agrilus bilineatus</i>
(Web.). S. |
| 9372a | <i>Buprestis consularis</i>
Gory. S. | 9499 | <i>Agrilus difficilis</i>
Gory. N. |
| 9377 | <i>Buprestis fasciata</i>
Fab. S. | 9508 | <i>Agrilus lacustris</i> Lec.
S. |
| 9386 | <i>Melanophila obtusa</i>
Horn. S. | 9522 | <i>Agrilus cephalicus</i> Lec.
S. |
| 9407 | <i>Chrysobothris scitula</i>
Gory. S. | 9539 | <i>Agrilus otiosus</i> Say. S. |
| 9408 | <i>Chrysobothris lecontei</i>
Leng. S. | 9548 | <i>Agrilus vittaticollis</i>
Rand. S. |
| 9448 | <i>Chrysobothris pusilla</i>
Cast. S. | 9551 | <i>Agrilus granulatus</i>
(Say). |

DRYOPIDAE (det Musgrave)

- | | | | |
|------|---|------|---|
| 9595 | <i>Throcinus politus</i> Csy.
S. | 9622 | <i>Helmis pusilla</i> (Lec.).
S. |
| 9603 | <i>Helichus lithophilus</i>
(Germ.). | 9635 | <i>Limnius ovalis</i> (Lec.).
N. |
| 9605 | <i>Helichus striatus</i> Lec.
S. | 9638 | <i>Heterelmis latiusculus</i>
(Lec.). N. |
| 9615 | <i>Helmis vittata</i> Melsh. | 9640 | <i>Macronychus glabratus</i>
(Say). N. |

DASCILLIDAE

- 9659 *Eurypogon niger* (Melsh.). N.

HELODIDAE

- | | | | |
|------|--------------------------------------|------|-------------------------------------|
| 9687 | <i>Helodes pulchella</i>
Guér. S. | 9688 | <i>Helodes fuscipennis</i>
Guér. |
|------|--------------------------------------|------|-------------------------------------|

CHELONARIIDAE

- 9717 *Chelonarium lecontei* Thom. S.

BYRRHIDAE

- 9847 *Nosodendron unicolor* Say.

NITIDULIDAE (determinations by Dietrich)

- | | | | |
|-------|--|-------|---|
| 10016 | <i>Cercometes abdominalis</i> | 10111 | <i>Amphotis schwarzi</i> |
| | (Er.). N. | | Ulke. S. |
| 10034 | <i>Conotelus stenoides</i> | 19689 | <i>Perthalykra carolina</i> |
| | Murr. S. | | Wickh. S. |
| 10058 | <i>Carpophilus brachypterus</i> (Say). | | <i>Glischrochilus quadrisignata</i> (Say). N. |
| 10061 | <i>Carpophilus nitens</i> Fall. | | S. type loc. |

CUCUJIDAE

- | | | | |
|-------|----------------------------|-------|-------------------------------|
| 10273 | <i>Brontes dubius</i> Fab. | 10276 | <i>Telephanus velox</i> Hald. |
|-------|----------------------------|-------|-------------------------------|

EROTYLIDAE

- | | | | |
|--------|------------------------------------|-------|------------------------------|
| 10282 | <i>Languria mozardi</i> Lat. | 10324 | <i>Tritoma tenebrosa</i> |
| | S. | | Fall. S. |
| 10286a | <i>Languria uhleri</i> Horn. | 10332 | <i>Triplax macra</i> Lec. S. |
| 10293 | <i>Acropteroxys lecontei</i> | 10346 | <i>Hypodacne punctata</i> |
| | Cr. S. | | Lec. S. |
| 10301a | <i>Ischyryus alabamiae</i> Schffr. | | S. type loc. |

DERODONTIDAE

- | | | | |
|-------|---------------------------------------|--|----|
| 10353 | <i>Derodontus maculatus</i> (Melsh.). | | S. |
|-------|---------------------------------------|--|----|

MYCETOPHAGIDAE

- | | | | |
|-------|--------------------------------------|-------|------------------------------|
| 10501 | <i>Mycetophagus pluri-</i> | 10521 | <i>Myrmecixenis latridi-</i> |
| | <i>punctatus</i> Lec. | | <i>oides</i> Cr. S. |
| 10508 | <i>Mycetophagus obsoletus</i> Melsh. | | |

COLYDIIDAE

- | | |
|-------|--------------------------------|
| 10551 | <i>Coxelus guttulatus</i> Lec. |
|-------|--------------------------------|

LATHRIDIIDAE

- | | | | |
|-------|--|--|--------------|
| 10621 | <i>Metophtthalmus americanus</i> Mots. | | S. type loc. |
|-------|--|--|--------------|

PHALACRIDAE

- | | | | |
|-------|------------------------------|--|----|
| 10777 | <i>Olibrus lecontei</i> Csy. | | S. |
|-------|------------------------------|--|----|

COCCINELLIDAE

- | | | | |
|-------|----------------------------|-------|-----------------------------|
| 10888 | <i>Hyperaspis regalis</i> | 11023 | <i>Scymnus natchezianus</i> |
| | Csy. S. | | Csy. S. |
| 10930 | <i>Hyperaspis undulata</i> | 11071 | <i>Scymnus cinctus</i> Lec. |
| | (Say). | 11192 | <i>Olla abdominalis</i> |
| 11011 | <i>Scymnus creperus</i> | | (Say). |
| | Muls. S. | 11231 | <i>Epilachna corrupta</i> |
| | | | Muls. N. |

CICIDAE (determinations by Dury)

- | | | | |
|-------|------------------------------|-------|-------------------------------|
| 12957 | <i>Cis lodingi</i> Dury. | 13007 | <i>Xestocis castlei</i> Dury. |
| | type loc. | 13030 | <i>Ceracis sallei</i> Mellié |
| 12979 | <i>Cis criberima</i> Nellié. | 13037 | <i>Octotemnus laevis</i> Csy. |
| | S. | | |

SCARABAEIDAE

- | | | | |
|--------|---|--------|--|
| 13047 | <i>Canthon vigilans</i> Lec. | 13496 | <i>Phyllophaga gracilis</i>
(Burm.). |
| 13050 | <i>Canthon chalcites</i> Hald.
N. | 13502 | <i>Phyllophaga calceata</i>
(Lec.). N. |
| 13053 | <i>Canthon perplexus</i>
Lec. | 13507 | <i>Phyllophaga bipartita</i>
(Horn.). N. |
| 13073 | <i>Phanaeus triangularis</i>
(Say). N., col. Dr.
W. B. Jones | 13508½ | <i>Phyllophaga cupuliformis</i> Langst. S. |
| 13119 | <i>Aphodius fimetarius</i>
(L.). N. | 13514 | <i>Phyllophaga horni</i>
(Smith). N. |
| 13180 | <i>Aphodius bicolor</i> Say.
S. | 13516 | <i>Phyllophaga anxia</i>
(Lec.). |
| 13263 | <i>Ochodaeus musculus</i>
(Say). S. | 13523 | <i>Phyllophaga forsteri</i>
(Burm.). S. |
| 13277 | <i>Hybosorus illigeri</i>
Reiche. N., col. Dr.
W. B. Jones. | 13536 | <i>Phyllophaga villiformis</i>
(Lec.). N. |
| | <i>Odontaeus alabamensis</i>
Wallis. S. type loc. | 13539 | <i>Phyllophaga delata</i>
(Horn.). N. |
| 13297 | <i>Geotrupes ulkei</i>
Blanch. N. | 13545 | <i>Phyllophaga albina</i>
(Burm.). S. |
| 13322 | <i>Acanthocerus aeneus</i>
McL. | 13552 | <i>Phyllophaga glabricula</i>
(Lec.). S. |
| 13355 | <i>Serica georgiana</i> Leng.
N. ^{1a} Sericas det.
Dawson. | 13562 | <i>Phyllophaga antennata</i>
(Smith). N. |
| 13357 | <i>Serica intermixta</i>
Blatch. S. | — | <i>Phytalus vanalleri</i>
Schffr. S. type loc. |
| 19969 | <i>Serica apatela</i> Daws.
N. type loc. | 13624 | <i>Polyphylla variolosa</i>
(Hentz.). N. |
| 19970 | <i>Serica mystaca</i> Daws.
N. | 13625 | <i>Polyphylla comes</i> Csy.
S. |
| 19976½ | <i>Serica parallela</i> Csy. S. | — | <i>Gronocarus autumnalis</i>
Schffr. S. type loc. |
| 13377 | <i>Diplotaxis rugosoides</i>
Schffr. S. | 13697 | <i>Hoplia limbata</i> Lec. N. |
| 13415 | <i>Diplotaxis densicollis</i>
Fall. S. | 13741 | <i>Pachystethus luciola</i>
(Fab.). S. |
| 13456 | <i>Diplotaxis texana</i> Lec.
N. | 13742 | <i>Pachystethus oblivia</i>
(Horn.). N. |
| 13488 | <i>Phyllophaga uniformis</i>
(Blanch.). ^{1a} S. | 13746 | <i>Strigoderma texana</i>
Csy. N. |
| 13489 | <i>Phyllophaga forbesi</i>
Glascow. S. | 13799 | <i>Ochrosidia protenta</i>
Csy. S. type loc. |
| 13491 | <i>Phyllophaga longitarsis</i>
(Say). N. | 13824 | <i>Ochrosidia seditiosa</i>
(Lec.). S. |
| | | 13859 | <i>Ligyryus tumulosus</i>
Burm. S. |

^{1a} *Phyllophagas* mostly determined by Sim.

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|-------|---|-------|---|
| 13868 | <i>Aphonus tridentatus</i>
(Say). S. | 13980 | <i>Cremastocheilus variol-</i>
<i>osus</i> Kby. N. |
| 13877 | <i>Aphonus saginatus</i>
Csy. S. type loc. | 14010 | <i>Osmoderma scabra</i>
(Beauv.). N. |
| 13899 | <i>Strategus sinuatus</i> Csy.
type loc. | 14026 | <i>Trichiinus parvulus</i> Csy.
N. |
| 13902 | <i>Xyloryctes satyrus</i>
(Fab.). N. | 14029 | <i>Trichiinus lunulatus</i>
(Fab.). S. |
| 13916 | <i>Phileurus texensis</i> Csy. | 14030 | <i>Valgus squamiger</i>
(Beauv.). |
| 13935 | <i>Euphoria limbalis</i> Fall.
S. | 14031 | <i>Valgus canaliculatus</i> L.
N. |
| 13964 | <i>Stephanucha areata</i>
(Feb.). | | |

LUCANIDAE

- | | | | |
|-------|--|-------|-------------------------------------|
| 14034 | <i>Pseudolucanus capre-</i>
<i>olus</i> (L.). | 14038 | <i>Dorcus brevis</i> Say. S. |
| 14036 | <i>Pseudolucanus placidus</i>
Say). N. | 14039 | <i>Dorcus parallelus</i> Say.
N. |
| 14037 | <i>Lucanus elaphus</i> Fab. | 14041 | <i>Platycerus quercus</i>
Web. |

CERAMBYCIDAE

- | | | | |
|--------|--|--------|---|
| 14067 | <i>Parandra brunnea</i>
(Fab.). N. | 14445 | <i>Brachyleptura circum-</i>
<i>data</i> var. with black
antennae. N. |
| 14141 | <i>Criocephalus nubilus</i>
Lec. S. | 14465 | <i>Strangalepta lineola</i>
(Say). S. |
| 14163 | <i>Methia necydalea</i>
(Fab.). S. | 14469 | <i>Strangalepta vittata</i>
(Oliv.). N. |
| 14227 | <i>Aneflomorpha sub-</i>
<i>pubescens</i> (Lec.). S. | 14481 | <i>Strangalia abdominalis</i>
(Hald.). S. |
| 14240 | <i>Anoplium cinerascens</i>
Lec. S. | 14514 | <i>Leptura emarginata</i>
Linn. |
| 14244 | <i>Anoplium pinorum</i> Csy.
S. | 14525½ | <i>Leptura atrata</i> Lec. S. |
| 14271 | <i>Heterachthes quadri-</i>
<i>maculatus</i> (Fab.). S. | 14544 | <i>Typocerus acuticauda</i>
Csy. S. |
| 14271a | <i>Heterachthes pallidum</i>
Hald. S. | 14548 | <i>Typocerus lugubris</i>
(Say). N. |
| 14278 | <i>Curius dentatus</i> Newn.
S. | 14554 | <i>Ophistomis acuminata</i>
(Oliv.). N. |
| 14395 | <i>Acmaeops directa</i>
(Newn.). N. | 14584a | <i>Molorchus corni</i> Hald.
S. |
| 14405 | <i>Acmaeops discoidea</i>
(Hald.). S. | 14584b | <i>Molorchus semiustus</i>
Newn. S. |
| 14438 | <i>Brachyleptura rubrica</i>
(Say). | 14668 | <i>Cyllene chara</i> (Say).
S. |
| 14441 | <i>Brachyleptura vagans</i>
(Oliv.). | 14741 | <i>Cyrtophorus verrucosus</i>
(Oliv.). N. |

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|--------|---|--------|--|
| 14746 | <i>Euderces pini</i> (Oliv.).
S. | 14985a | <i>Leiopus floridanus</i>
Hald. S. |
| 14748 | <i>Euderces reichei</i> Lec.
S. | 14986 | <i>Leiopus foveatocollis</i>
Ham. S. |
| 14792b | <i>Tragidion fulvipenne</i>
(Say). S. found
frequently in copula-
tion with <i>T. coquus</i> . | 15001 | <i>Lepturges querci</i>
Fitch. S. |
| 14853 | <i>Batyle ignicollis</i> (Say).
S. | 15011 | <i>Hyperplatys nigrella</i>
Hald. S. |
| 14906 | <i>Ptychodes trilineatus</i>
(L.). S. | 15018 | <i>Hyperplatys femoralis</i>
Hald. S. |
| 14923 | <i>Microgoes oculatus</i>
(Lec.). N. | 15072 | <i>Eupogonius subarmatus</i>
(Lec.). N. |
| 14925 | <i>Plectrodera scalator</i>
(Fab.). | 15073 | <i>Eupogonius fraxini</i>
Knull. S. |
| 14933 | <i>Aegomorphus morrissi</i>
Uhler. | 15113 | <i>Saperda calcarata</i> Say.
S. |
| 14944 | <i>Leptostylus albescens</i>
(Hald.). S. | 15113a | <i>Saperda adspersa</i> Lec.
S. |
| 14953 | <i>Leptostylus arcuatus</i>
Lec. S.
<i>Leptostylus knulli</i>
Fisher. N. | 15117 | <i>Saperda vestita</i> Say.
N. |
| 14960 | <i>Astylopsis macula</i>
(Say). N. | 15119 | <i>Saperda lateralis</i> Fab. |
| 14961 | <i>Astylopsis guttata</i>
(Say). S. | 15124 | <i>Mecas cana</i> (Newn.).
S. |
| 14976 | <i>Leiopus fascicularis</i>
(Harris). | 15128 | <i>Mecas marginella</i> Lec.
S. |
| | | 15148a | <i>Oberea tripunctata</i>
(Fab.). S. |
| | | 15156 | <i>Tetrops jucunda</i> Lec. |

CHRYSOMELIDAE

- | | | | |
|--------|--|--------|--|
| 15198a | <i>Donacia cincticornis</i>
Newn. S. | 15440 | <i>Pachybrachys bivittatus</i>
(Say). N. |
| 15203 | <i>Donacia subtilis</i> var.
<i>tryphera</i> Schffr. S. | 15461 | <i>Pachybrachys confusus</i>
Bowd. S. |
| — | <i>Donacia vicina</i> Lac. S. | 15495c | <i>Cryptocephalus ornatu-</i>
<i>lus</i> Clav. S. |
| 15217a | <i>Donacia flavipes</i> var.
<i>lodingi</i> Schffr. S.
type loc. | 15504 | <i>Cryptocephalus trizon-</i>
<i>atus</i> Suffr. N. |
| 15226 | <i>Zeugophora abnormis</i>
(Lec.). S. | 15507 | <i>Cryptocephalus muta-</i>
<i>bilis</i> Melsh. S. |
| 15282b | <i>Babia tetraspilota</i> Lec.
S. | 15534 | <i>Bassareus mammifer</i>
(Newn.). N. |
| 15309 | <i>Griburius equestris</i>
(Oliv.). S. | 15545 | <i>Nodonota tristis</i>
(Oliv.). |
| 15407 | <i>Pachybrachys atom-</i>
<i>arius</i> (Melsh.). | 15546 | <i>Nodonota clypealis</i>
Horn. |

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|-------|---|--------|---|
| 15549 | <i>Nodonota puncticollis</i>
(Say). | | <i>Oedionychis discicollis</i>
Dej. S. |
| 15573 | <i>Xanthonia decemnotata</i>
(Say). | 15902a | <i>Disonycha leptolineata</i>
Blatch. |
| 15591 | <i>Metachroma angustulum</i> Cr. S. | 15904 | <i>Disonycha discoidea</i>
(Fab.). |
| 15657 | <i>Zygogramma heterothecae</i> Linell. S. | 15905 | <i>Disonycha funerea</i>
(Rand.). S. |
| 15677 | <i>Calligrapha bigsbyana</i>
(Kby.). N. | 20209 | <i>Disonycha lodingi</i>
Schffr. S. type loc. |
| 15708 | <i>Lina lapponica</i> (L.). | 20210 | <i>Disonycha alabamiae</i>
Schffr. S. type loc. |
| 15771 | <i>Diabrotica balteata</i> Lec. | | |
| 15794 | <i>Phyllobrotica limbata</i>
(Fab.). | 16032 | <i>Longitarsis varicornis</i>
Suffr. S. |
| 15811 | <i>Luperodes davisii</i> Leng.
N. | 16159 | <i>Metriona purpurata</i>
(Boh.). S. |
| 15851 | <i>Phyllecthrus dorsalis</i>
(Oliv.). | | <i>Metriona lodingi</i>
Schffr. S. type loc. |
| 15860 | <i>Pachyonychus paradoxus</i> Melsh. N. J.
DeJarnette collector. | | <i>Metriona marginepunctata</i> Schffr. S. type
loc. |
| 15863 | <i>Pseudolampsis guttata</i>
(Lec.). S. | 16161 | <i>Coptocycla repudiata</i>
Suffr. S. |
| 15872 | <i>Oedionychis interjectionis</i> Cr. S. | | <i>Coptocycla pinicola</i>
Schffr. S. type loc. |

MYLABRIDAE

- 16182 *Mylabris bivulneratus* Horn. N.

PLATYSTOMIDAE

- | | | | |
|-------|---|-------|---|
| 16282 | <i>Tropideres bimaculatus</i>
(Oliv.). | 16308 | <i>Brachytarsus plumbeus</i>
Lec. S. |
| 16288 | <i>Piezocorynus dispar</i> Gyll. S. | | |

CURCULIONIDAE

- | | | | |
|--------|---|-------|--|
| 16492 | <i>Tachygonus lecontei</i>
Gyll. S. | 16780 | <i>Listronotus americanus</i>
Lec. S. |
| 16590 | <i>Aracanthus pallidus</i>
(Say). S. | 16783 | <i>Listronotus appendiculatus</i> (Boh.). |
| 16732a | <i>Sitona hispidiceps</i> Csy.
S. | 16787 | <i>Listronotus floridensis</i>
Blatch. S. |
| — | <i>Listroderes obliquus</i>
Fab. S. | 16801 | <i>Hyperodes solutus</i>
(Boh.). S. |
| — | <i>Listroderes apicalis</i>
Waterh. S. | 16820 | <i>Hyperodes subscrib-
ratus</i> (Dietz). S. |
| 16772 | <i>Listronotus obliquus</i>
Lec. | 16838 | <i>Hyperodes porcellus</i>
(Say). S. |

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|--------|---|--------|---|
| 20263 | <i>Hyperodes lodingi</i>
Blatch. S. type loc. | 20398 | <i>Pseudobaris providens</i>
Csy. S. |
| 16881 | <i>Derolomus bicolor</i>
Lec. S. | 17603 | <i>Pachybaris porosa</i> Lec.
S. |
| 17026 | <i>Anchodemus hubbardi</i>
Lec. S. | 17624 | <i>Limnobaris blandita</i>
Csy. S. |
| 17030 | <i>Bagous magister</i> Lec. | 17646 | <i>Limnobaris rectirostris</i>
(Lec.). S. |
| 17128 | <i>Oopterinus perforatus</i>
(Horn.). N. | 17659 | <i>Stethobaris ovata</i> Lec.
S. |
| 17160 | <i>Balaninus pardalis</i>
Chitt. ² S. | 17744 | <i>Auleutes tenuipes</i>
(Lec.). S. |
| 17176 | <i>Balaninus victoriensis</i>
var. <i>fulvus</i> Chitt. S. | 17747 | <i>Auleutes subfasciatus</i>
Dietz. S. |
| 17409 | <i>Lixus amplexus</i> Csy.
S. | 17842 | <i>Rhinoncus pyrrhopus</i>
Boh. S. |
| 17415 | <i>Lixus musculus</i> Say.
S. | 17887 | <i>Conotrachelus cribicollis</i> (Say). S. |
| 17425a | <i>Lixus profundus</i> Chitt.
S. | 17889 | <i>Conotrachelus tuber-</i>
<i>osus</i> Lec. S. |
| 17432 | <i>Lixus fimbriolatus</i>
Boh. S. | 17892 | <i>Conotrachelus leu-</i>
<i>cophacatus</i> Fahr. S. |
| 17434 | <i>Lixus julichi</i> Csy. S.
<i>Lixus lodingi</i> Chitt. S.
type loc.
<i>Lixus tricristatus</i> Chitt.
S. type loc.
<i>Lixus regularipennis</i>
Chitt. S. type loc. | 17986 | <i>Cryptorhynchus tristis</i>
Lec. S. |
| 17470 | <i>Baris cuneipennis</i> Csy. | 18102 | <i>Calendra</i> (<i>Sphenoph-</i>
<i>orus</i> Schön.) <i>aequalis</i>
(Gyll.). S. ³ |
| 20301 | <i>Baris vagans</i> Csy. | 18106 | <i>Calendra latinasus</i>
(Horn.). S. |
| 20307 | <i>Baris surrufa</i> Csy. S.
type loc. | 18125 | <i>Calendra chittendeni</i>
(Blatch.). S. |
| 20342 | <i>Baris modicella</i> Csy. | 18131 | <i>Calendra destructor</i>
(Chitt.). S. |
| 20349 | <i>Baris mobiliensis</i> Csy.
S. type loc. | 18133 | <i>Calendra scoparius</i>
(Horn.). S. |
| 17518 | <i>Glyptobaris rugicollis</i>
(Lec.). S. | 18155 | <i>Calendra oblitus</i> (Lec.) |
| 17554 | <i>Pseudobaris farcta</i>
(Lec.). S. | 20614½ | <i>Calendra callosipennis</i>
Chitt. |
| | | 20616 | <i>Calendra deficiens</i>
Chitt. S. |

² Determination of *Balaninus* and *Lixus* by Chittenden.³ Determination of *Calendra* by Satterthwait.

TRAVELS IN SCANDINAVIAN COUNTRIES.¹

BY GEO. P. ENGELHARDT, Hartsdale, New York.

The advance party of about twenty American delegates to the Fifth International Congress of Entomology embarked on the S.S. *Leviathan* at New York on June 6 and arrived in Bremen on June 15, allowing one month for travel before the opening of the Congress in Paris on July 15, 1932. For this month a carefully selected itinerary had been prepared by our leader, Dr. J. Chester Bradley, in large part devoted to the Scandinavian countries, which will be the subject of my report.

En route to Copenhagen, only one day each was given to hurried sightseeing in Bremen and Hamburg and likewise to Luebeck and Rostock, Hanseatic cities unchanged since their time of renown as shipping centers in the Middle Ages. Rostock still attains to some importance because of its university registering 3,000 students and its well-equipped Entomological Seminar in charge of Drs. Schulze and Friedrichs. Here we put up at the old fashioned Hospiz Maria Martha, with rosy-cheeked lassies undergoing their housekeeping training under strict supervision of the Mother Superior, looking after our comforts. Awakened early in the morning from a sound sleep in a featherbed by the rumbling of heavy drays over rough cobblestones, I rubbed my eyes to come back to realities. The view from my room on the top floor was in line with the red tiled roofs of heavily beamed, narrow-gabled houses, a scene setting back the clock easily 500 years! We breakfasted among flower beds of an inclosed court, in full view of curious, friendly neighbors wishing us "Guten Morgen" and "Guten Appetit."

Only 6 hours' travel from Rostock, by train and ferry, we arrived in Copenhagen on the evening of June 18, noting on the way the rich verdure of pasture lands, purple and yellow lupines and the many red cows. In Germany the black and white Holsteins prevail.

Three and a half days in Copenhagen were busily filled with a program covering the principal points of interest in the city and in not too distant parts of the country. Denmark has suffered far less from the depression following the world war than other nations in Europe. The shopping centers presented lively marts and places of amusement showed no lack of patronage. Traffic prob-

¹ Read at the meeting, Brooklyn Entomological Society, March 16, 1933.

lems are created chiefly by the hordes of people on bicycles. All the Danes, it seems, ride on two wheels. Most of them speak English or German. There is little trouble in being understood. Of course, every tourist wants to see the famous sculptures by Thorwaldsen, but even more enjoyable are apt to prove the composite collections of sculptures, paintings and antiquities so beautifully housed in the Glyptotheket, one of the finest museums in Europe. Natural history is amply provided in the university, not collections arranged for exhibition, but rather for purposes of study.

On crowded streets, in fact everywhere, there is quite a sprinkling of the military, sturdy, upstanding fellows in gay uniforms. They are housed in blocks of severe, austere barracks. This impression of austerity applies as well to government buildings and edifices. More lovely sections must be looked for in suburban developments. Such charming houses and gardens, some, on hilly shores, face the bay across to Sweden.

At this time, with the modification of our Prohibition Law under serious consideration, mention should be made of a firm in Copenhagen, incorporated for the manufacture of beer—good beer. The unique will of the owner and originator, Mr. Carlsberg, provided that a large part of the income of the very prosperous brewery be set aside as a support for museums and institutions of education. Without this support, it is safe to assert, such institutions would be greatly handicapped or unable to function. Hence it is a patriotic duty in Denmark to drink beer. Even members of our party of Puritan ancestry could not resist the appeal.

A gratifying development, not only in the Scandinavian countries, but throughout most of Europe as well, are the so-called war gardens, so short-lived in America, but permanently established abroad. How much pleasure and keen rivalry they afford the working people in the profitable cultivation of vegetables, fruit and flowers and how much they have contributed in beautifying the usual sordid approaches to cities and towns. Each small garden is carefully separated by hedges of oak, beech, maple, linden and thorn, the sturdy plants trained and trimmed in expert fashion. Our customary hedges of privet and barberry are rarely seen. Our common golden rods are rapidly gaining in popularity and very striking effects are being obtained in parks and gardens.

Two days had been reserved for auto excursions from Copenhagen, the first a sightseeing drive along the picturesque shore of Ore Sound to Helsingor (Elsinore) where Hamlet is buried, then inland to Fredensborg, the king's hunting lodge and to Fredriks-

borg, a very large, renovated castle, turned into a historical museum exhibiting in 60 rooms the cultural progress of Denmark from past to present. This is a magnificent castle, dominating a landscape of beautiful parks, lakes, superb avenues of old lindens and elms and extensive forests. On the second excursion, as the guests of the Copenhagen Entomological Society, we were welcomed by Dr. Cram and his staff at the Agricultural Station on Lake Furesø and profited by a thorough inspection of the fine laboratories and experimental grounds. Their chief problems appear to be connected with rusts and fungous diseases rather than insect pests. After a delightful luncheon, presided over by Mrs. Cram, we indulged in a real cross country ramble, under the expert guidance of our Danish entomological friends. They certainly know the beauty spots of their domain. From a gorse-covered hilltop we listened to the song of nightingales and skylarks, all along we passed bunches of elk and deer and then entered the ancient forest at Ermitage, a veritable fairyland of old, gnarled, weather-beaten oaks and beeches, the finest I have ever seen. No wonder folklore has peopled them with sprites and gnomes. It spurs one's imagination.

This unforgettable day culminated with a dinner, again provided by the Entomological Society, at the Tivoli, Copenhagen's most popular amusement resort. With all the contraptions of Coney Island, games of chance, music and dancing, frivolous and refined, it maintains to a high degree an atmosphere of respectability, appreciated by all, rich or poor. We were led through a pretentious pavilion and restaurant into a private dining room to behold, at first glance, an exhibition of the Danish culinary arts. To our wonder and consternation we were invited to take seats at the tables piled high with jellied, fantastic creations and hors d'oeuvres innumerable in kinds. Dish after dish of delicious novelties had to be sampled, then, taking breath standing, while the orchestra struck up the American National anthem, the real meal began. Fish, meats, fowl, liquid refreshments, followed in endless procession and then desserts, but memory fails me there. This was our introduction to the undiluted pleasure of dining in Denmark—a very commendable custom if practised with discretion.

On June 22 we ferried across Öre Sound, boarding a waiting train at Malvo for Lund, one of the two university towns in Sweden. The very extensive entomological collections there, in charge of Dr. Kemmerer, include original specimens in an excellent state of preservation, collected by Linnaeus and other early European entomologists. The fine botanical garden also should be visited for

its careful grouping and labelling. From Lund we proceeded to Mjölby, thence by canal-boat through flat, rich agricultural country to Linköping, a quaint, mediaeval little town. Stockholm was reached at noon, June 24.

Of all the European capitals, Stockholm is greatly favored by the beauty of its natural setting. The old part of the city is divided from the new by deep, clear waterways, fronted on either bank by many of the principal public buildings, mansions, castles and parks. The two parts are linked by numerous bridges of imposing architectural design. For our party many experiences enjoyed in Copenhagen were repeated in Stockholm. There were sightseeing trips through the city and its environs, visits to museums, educational institutions, places of amusement, dinners at noted restaurants and a day's boat excursion through a picturesque chain of rivers and lakes to the historic castle of Stokloster, famous for its collection of small arms as well as other worth-while objects in the way of tapestries, paintings and antiquities. Returning we stopped one hour at Sigtuna, a little hamlet with ruins of a church and cloister dating back to the 10th century. Still earlier occupation was indicated by the many Viking stones, small and large, strewn about.

The Natural History Museum (Riksmuseet), the agricultural stations and science laboratories have all been segregated in an attractive hilly, wooded section, several miles outside the city. Dr. Lundblad and his colleagues entertained us at the entomological laboratory, as well as at his home, and the same courtesy was extended to us by Dr. Tragarth of the Forestry College. The Natural History Museum will be remembered for the fine modern edifice in which its superb collections are housed. It is one of the few museums in which full advantage has been taken of the wonderful opportunities for highly attractive as well as instructive insect exhibits.

Uppsala, the oldest Swedish University town, two hours by train from Stockholm, held our interest chiefly as the home and headquarters of the world's most famous naturalist—Carl von Linné. Here and at Hammarby, his country seat ten miles away, he accomplished most of his epoch-making work. Both his old-fashioned town house and his country estate have been dutifully preserved as public monuments. Following the paths in his garden and rambling through woods and dales at Hammarby to us meant treading on hallowed ground. The same arctic flowers collected in Lapland and first introduced by Linné are still flourishing at Hammarby.

Boarding the train at Uppsala at sunset, 10 or rather 22 o'clock, according to the Swedish reckoning of time, we found our sleeping compartments ready for the longest stretch of our railroad travels, two nights and a day to Lapland within the Arctic Circle. How we indulged in the comforts and rest after such strenuous days!

From agricultural lands, mostly wheat, rye, and red clover in pure stands two feet high, we passed through hilly forest sections of balsam, spruce, birch and alder, not large trees, very much like our north woods. The breed of cattle here runs to tan colors, growing still lighter northward. Surprisingly little wild animal life was seen, hardly any water birds on the many lakes and swamps. Insects also were scarce. Occasionally a Pierid, Colias and Grapta among the butterflies, but lots of bumblebees.

At 23:30 o'clock of the second day we passed over the line of the Arctic Circle, marked by a sign post, still readable in a sort of twilight. Only about two hours of darkness here. The landscape now is bleak and barren. Low, sprawling vegetation, long stretches of bogs covered with cotton grass, turbulent streams rushing from snow covered mountains through deep gorges.

The beauty and delight of an arctic environment can be truly appreciated only through intimate acquaintance, such as was our experience after arriving at the tourist station Abisko, in the heart of Lapland and the land of the Midnight Sun. This station and miles of the surrounding country have been set apart as a National Park, within the limits of which the preservation of plants and wild animals is strictly enforced. It is a popular resort with good accommodation for the tourist traffic in a commodious main building and in cottages. All meals are served buffet or cafeteria fashion. You help yourself and eat as much as you want. Mostly every menu includes fresh trout, caught daily in the gorge below a thundering waterfall north of the hotel or in the sixty mile long lake at a lower level to the east. Snow fields and rugged mountains are in view in all directions.

Laplanders from a camp at the head of the lake paddle across daily to offer their wares of skins, carved reindeer bones and native embroideries. One old fellow exhibited his colored crayon sketches, truly original work, comparing favorably with some of the exhibits palmed off in New York as modernistic art.

During a two days' stay we managed to get in a motor boat trip on the lake to the Lapland camp and some strenuous mountain climbing over banks of melting snow. Personally, I was hoping to encounter at high altitudes the Lemming, a curious rodent,

which after a period of years appears in countless numbers to start a resistless migration, which usually ends in disaster over high cliffs facing the sea. In off years these animals are rarely seen. All we could discover were burrows and pellets among ledges. Insect collecting was done assiduously and successfully by Dr. Van Dyke for Carabidae, by Dr. Bradley for bumblebees, by Mr. Hockett for Diptera and by Prof. Schadel in all orders. My own interests, the Aegeriidae or clear-wing moths, were poorly represented, only one species boring in birch, of which Mr. Hockett was fortunate in capturing a fine pair for me. A small, miscellaneous collection of butterflies, moths and beetles was gathered by me, chiefly for the purpose of showing and distributing among members of the Brooklyn Entomological Society.

Spring had barely set in, yet what a profusion of delicate, exquisite flowers, if looked for in the right locations from lake shore to mountain top. Alpine and arctic flora have much in common the world over. One meets old friends, close kin and some entirely new. It seems that the harder the struggle for existence, the more perfect the result. A display of the principal arctic flowers, correctly labelled, in a garden patch at the hotel facilitated their determination.

Time at Abisko is not of importance. We had clear weather and sunshine for 24 hours. Of course the temperature drops towards evening, somewhat subduing animal life, but not the bumblebees, they work at all hours. Hotel guests sleep when ever they feel so inclined, pulling down their green window shades to give an illusion of night.

The midnight sun can be seen at Abisko as well, or nearly as well, as at the North Cape. Still we felt the impulse to go on, to see the high mountains, the fjords and precipitous coast of Norway. The train climbs steadily, hugging mountain sides, passing through tunnels and snowsheds, at every turn vistas of gorges, waterfalls, lakes and often herds of reindeer. It is a wonderful scenic route. Then we descended rapidly, close to the shore of Fjord Ofaten and on to Narvik, a small but busy seaboard town.

The warmer climate of the Norway coast from that of Sweden is indicated by the larger growth and greater variety of trees. Even apple, plum and other fruit trees appear to do fairly well at Narvik. The town is built against the side of a high, snow-covered mountain, facing a wide bay and many outlying islands. It is a stopping place for the coastwise trade and seafaring people, hardy Norseman and Laplanders in native costumes crowd the narrow streets. Business, of course, is subject to a regulation of

working hours, but there is no time limit to other activities among the inhabitants during the season of the midnight sun.

The little steamer "Mosken" was waiting at the dock on the morning of July 2d, ready for the four-day excursion to the North Cape. Our party, meanwhile, had increased to 25, about filling the cabin and dining room accommodations of the boat. A large number of the town's population had assembled to see us off and to listen to the cheery airs played by the steamer orchestra—two fiddles and an accordion. The captain and his officers were solicitous in assuring our comfort. Altogether it was a grand feeling.

The day turned out squally with occasional showers. Sweaters and great coats were not amiss on the upper deck. Our route followed closely the rugged coast, sheltered from the Atlantic by an archipelago of outlying islands. Stops were made at Finsnes and Trömsö, the latter a harbor of importance, where autos took us through the town into the back country with rich meadows and woodlands of birch and aspen. Time was ample for an inspection of the many curio shops and trading posts. Arctic furs were offered at bargain prices—polar bear in prime condition at \$25.00, silver fox \$25.00 to \$50.00.

Under way again late at night, the storm clouds rifted, revealing the sun at the northern horizon, its lights suffusing sky and water in unearthly radiance. It was superb—a rarely beautiful view of the midnight sun.

At noon, July 3, we stopped at Hammerfest, reputed as the world's northernmost town. A severe climate has forestalled attempts at beautifying effects. Like the surrounding landscape the town seems sturdy, but bleak and barren. Again we were treated to a sightseeing auto trip, utilizing odd moments to collect carabid and rhynchopherous beetles, fairly common under stones along the roadside.

The climax of scenic grandeur is north of Hammerfest. Towering, perpendicular cliffs and narrow fjords to the right and upstanding, rocky islands to the left. Marine birds were not too numerous until we reached Fuglebjerg (bird rocks) when a blast from the foghorn stirred up myriads—gulls, terns, cormorants, puffins and whatnot. Shortly after we came to anchor for a fishing experience—all cod, a dozen or more weighing 5 to 10 pounds, speedily caught in deep water by jigging a hand line with stout hook and shining spoon.

North Cape, standing out abruptly, stark and naked to a height of 1200 feet, dominates the coast line long before it is reached. Rounding the Cape, we anchored in a small bay at 22 o'clock to be

taken ashore in a motorboat, heaving in a heavy swell. A narrow, zigzag trail leads to the windswept, barren top. At the outer edge stands a geodetic monument and nearby a shack labelled "Post Office" and another where hot coffee and crullers are served. Both did a rushing business. The outgoing mail was literally covered with sets of stamps featuring North Cape and the hot coffee and crullers made a hit in the chilly mist and drizzle of rain which had set in. No midnight sun that day.

Dog tired and shivering we returned to the ship at 2 a. m. The captain awaited us in the dining saloon. Platters heaping with boiled cod and butter sauce, boiled potatoes and old port were brought in. How we regaled ourselves! I swear boiled fresh cod is the best of fish.

As in the outward, so in the return passage, we witnessed an almost continuous procession of Russian freighters, timber laden. What is the portent of developments in the country of the Soviets? How will it affect a Europe ridden with traditions? Are we keeping abreast of the times?

Hister semisculptus Leconte.—So far as I have been able to find out this species has never been recorded since its description by Dr. LeConte in 1863 from Illinois; I think it is represented by the unique type, but I am not quite sure of this.

On May 20, 1933, while I was walking along the main street of this town about noon, I grabbed a flying insect out of the air with my hand and that evening I found out that I had taken a *Hister* entirely unknown to me; I also found in my box another specimen which had been taken under a pile of lawn grass in the back yard on July 1, 1929. This too had been set aside as unknown to me.

I sent both specimens to Mr. Fall who wrote me that it was easily identified as *semisculptus* but probably very rare and not recorded from N.E. and not in his collection.

It may be that this species is a true city dweller and has therefore been overlooked by our industrious collectors.—C. A. Frost, Framingham, Mass.

NOTES ON WEST INDIAN TRYPETIDAE (DIPTERA).

BY MARSTON BATES, Museum of Comparative Zoölogy,
Cambridge, Mass.

The following list of the West Indian Trypetidae demonstrates quite clearly the inadequacy of our knowledge of the Diptera of the region: the large proportion of forms known from only one or two specimens shows how much there is yet to be done. The fauna is probably poor, as compared with areas of similar size on the American mainland or in the Old World tropics, but we do not yet have enough material to form any idea of the number of species that may exist there, or of the relationships of the fauna.

I have refrained from describing several of the apparently new forms because of the inadequacy of the material. It will probably eventually be found that many of the species have broken up into island races sufficiently distinct to warrant naming, but such splitting has little significance except when based on good series of specimens.

The material on which this paper is based is mostly in the collection of the Museum of Comparative Zoölogy. A field trip to Cuba during the past summer was made possible by a grant from the Atkins Foundation of Harvard University. I am very much indebted to Professors Barbour, Bequaert and Banks of Harvard and to Mr. F. H. Benjamin of the United States Bureau of Entomology for many and varied courtesies and suggestions in this, as in all of my work on fruit-flies. Mr. Graham Fairchild, who was with me in Cuba, collected many of the specimens.

1. *Toxotrypana curvicauda* Gerstaecker

Gerstaecker, 1860, p. 194 (St. Jean); Hendel, 1914, p. 10; Knab and Yothers, 1914 (biology, Fla.); Wolcott, 1924, p. 229 (P. R.); Greene, 1929, p. 491 (larva, Canal Zone).

Mikimyia furcifera Bigot, 1884, p. 29 (Brazil).

This species seems always to be very erratic in its local distribution. Many wild papayas in the vicinity of the Harvard station at Soledad were examined during the past summer, without finding it, although fruit at San Blas, in the near-by Trinidad Mountains, was heavily infested. I was very surprised to find this species breeding in the seed pods of an Apocynaceous tree, probably *Tabernaemontana*, in heavy forest near Soledad. The

adults seem to be identical with specimens bred from *Carica papaya*.

2. *Anastrepha acidusa* (Walker)

Trypeta (*Tephritis*) *acidusa* Walker, 1849, p. 1014 (Jam.).

Anastrepha acidusa Bezzi, 1909, p. 284; Hendel, 1914, p. 15; Johnson, 1919, p. 445 (Jam.); Gowdey, 1926, p. 87 (Jam.).

Anastrepha fraterculus auct. (*nec* Wied.); Wolcott, 1924, p. 229 (P. R.); Gowdey, 1926, p. 87 (Jam.), etc.

Mr. F. H. Benjamin secured a photograph of Walker's type, and has been able to identify the species as the common *Spondias* form of the West Indies. The dorsum of the thorax has three light yellow longitudinal stripes, which will always separate it from the following species; in our series, the V-shaped mark of the wing is always connected with the marginal band of the apex. The true *fraterculus* of Wiedemann does not seem to occur in the West Indies.

I bred this species in Cuba from *Spondias spp.* (*jobos*) and *Mangifera indica* (mango), finding it rare in the latter fruit. We have some 30 specimens of this species from Cuba, Puerto Rico and Dominica.

3. *Anastrepha suspensa* (Loew)

Trypeta suspensa Loew, 1862, p. 69, pl. II, f. 5; *id.*, 1873, p. 222, pl. X, f. 5 (Cuba).

Anastrepha suspensa Bezzi, 1909, p. 284; Hendel, 1914, p. 16; Gowdey, 1926, p. 87 (Jamaica).

The coloring in Loew's figure is very much exaggerated; the type, which is quite well preserved, does not present any striking differences from the ordinary *fraterculus* type of wing pattern and coloration. It seems to me very possible that the infuscation of the second basal cell—not really prominent—may be an individual variation. I am therefore tentatively placing all Cuban specimens with a uniform brown dorsum of the thorax under this name, even though all except the type have the second basal cell clear.

There are 18 captured specimens from Central Soledad (Cuba) in the MCZ.

4. *Anastrepha tricineta* (Loew)

Trypeta (*Acrotoxa*) *tricincta* Loew, 1873, p. 225 (Hayti).

Anastrepha tricineta Bezzi, 1909, p. 284; Hendel, 1914, p. 16.

The MCZ has only Loew's type, which was caught on ship-board off Haiti. I have seen a female from the National Museum, undoubtedly belonging to this species, caught in Cuba. It is a very distinct form, very dark, almost like *serpentina*, with a long terminal abdominal segment of the *ludens* type.

5. *Anastrepha ocrexia* (Walker)

Trypeta (*Tephritis*) *ocresia* Walker, 1849, p. 1016 (Jamaica).

Anastrepha ocrexia Bezzi, 1909, p. 283; Hendel, 1914, p. 15;

Johnson, 1919, p. 445; Gowdey, 1926, p. 87 (Jam.).

I have seen nothing that can be certainly identified as this species; it is probably similar to *A. tricineta*.

6. *Anastrepha serpentina* (Wied.)

Dacus serpentinus Wiedemann, 1830, p. 521 (Brazil).

Anastrepha serpentina Hendel, 1914, p. 16.

This species is recorded from the Lesser Antilles by Ballou, 1912, p. 110. It is common almost everywhere on the continent, and may very well occur over these islands, although I have seen no specimens from there, and know of no record in the taxonomic literature.

7. *Acidia fallax* Johnson

Johnson, 1919, p. 445 (Blue Mts., Jamaica); Gowdey, 1926, p. 87 (Jam.).

This species will probably best be placed in the genus *Philophylla* as defined by Hendel in his 1927 paper on the Palearctic Trypetidae; I have seen no West Indian specimens of this group.

8. *Blepharoneura poecilosoma poecilogastra* (Loew)

Trypeta (*Blepharoneura*) *poecilogastra* Loew, 1873, p. 270 (Cuba).

Blepharoneura poecilosoma var. *poecilogastra* Hendel, 1914, p. 21.

I have seen no material from Cuba except Loew's type; it would be impossible to determine the exact status of the Cuban insect without more material.

9. *Hexachaeta dinia* (Walker)

Trypeta (*Euleia*) *dinia* Walker, 1849, p. 1040 (Jam.).

I have seen no West Indian specimens that could be assigned

to *Hexachaeta*. The literature on *dinia* seems to consist mostly of various people's guesses as to what it may be.

10. *Polymorphomyia basilica* Snow

Snow, 1894, p. 165, pl. VII, f. 1 (Santo Domingo); Hendel, 1914, p. 28; Wolcott, 1924, p. 229 (P. R.); Curran, 1931, p. 15 (P. R.).

I have two Cuban specimens of this beautiful little species, one from Soledad, near Cienfuegos, and the other from the near-by Trinidad Mountains (San Blas, 2,000 ft. elevation). Wolcott bred the species from "an elongate gall on the stem of *Eupatorium odoratum*."

11. *Tomoplagia discolor* (Loew)

Trypeta discolor Loew, 1862, p. 64, pl. II, f. 1 (Cuba).
Trypeta (Plagiotoma) discolor Loew, 1873, p. 250, pl. X, f. 1.
Tomoplagia discolor Hendel, 1914, p. 35.

There is only one specimen in the MCZ besides Loew's type: a male labelled "Cuba, Wright," presumably from Baracoa. This is very likely the *Tephritis obliqua* listed from Cuba by Bigot, 1857, page 823.

12. *Tomoplagia pura* (Curran)

Plagiotoma pura Curran, 1931, p. 16 (P. R.).

I do not know this species. It is said to differ from *discolor* in having the abdomen rusty-reddish with black spots instead of all black. Our Cuban specimens show some variation in this regard.

13. *Tomoplagia incompleta* (Williston)

Trypeta (Plagiotoma) incompleta Williston, 1896, p. 378 (St. Vincent).

I have not seen this species.

14. *Xanthaciura insecta* (Loew)

Trypeta insecta Loew, 1862, p. 72, pl. II, f. 8 (Cuba).
Trypeta (Aciura) insecta Loew, 1873, p. 268, pl. X, f. 8 (Cuba, Hayti).

Aciura insecta Doane, 1899, p. 182 (Jam.); Johnson, 1908, p. 78 (Bahamas); *id.*, 1919, p. 445 (Jam.); Wolcott, 1924, p. 229 (P. R.); Curran, 1928, p. 71 (P. R.); Gowdey, 1926, p. 87 (Jam.).

Xanthaciura insecta Hendel, 1914, p. 46.

There are 46 specimens in the MCZ from various localities in the Bahamas, Cuba, Haiti, Jamaica. The adults are common in the flowers of *Bidens*, in which the larvae apparently live.

15. *Xanthaciura phoenicura* (Loew)

Trypeta (*Aciura*) *phoenicura* Loew, 1873, p. 269, pl. XL, f. 12 (Brazil); Williston, 1896, p. 376. (St. Vincent).

Xanthaciura phoenicura Hendel, 1914, p. 47 (Bolivia, Peru).

There seems to be no record of this widely distributed species from the West Indies, except that of Williston. One specimen in the MCZ from Habana, Cuba, is close to *phoenicura* in structure, and may represent an insular form.

16. *Paracantha cultaris* (Coq.)

Trypeta (*Carphotricha*) *cultaris* Coquillett, 1894, p. 72 (Calif.).

Paracantha culta (*partim*) Hendel, 1914, p. 50.

Four specimens from Port-au-Prince, Haiti, are very similar to Central American specimens in having a short terminal abdominal segment in the female, and one brown ray in the submarginal cell of the wing, as described by Coquillett. This form seems to be quite worthy of specific rank.

17. *Acrotaenia testudinea* Loew

Trypeta (*Acrotaenia*) *testudinea* Loew, 1873, p. 272, pl. XI, f. 13 (Cuba).

Acrotaenia testudinea Hendel, 1914, p. 59.

I have four specimens from Cuba which belong to the genus *Acrotaenia*, apparently including two species. The material is partly in a very poor state of preservation, however, and as there seems to be considerable variation in wing pattern in the group, I hesitate to make a new name without more specimens. The type of *testudinea* is in Berlin, but Loew's description seems quite clear. Hendel made a mistake in his key (1914, *l.c.*): *latipennis* Wied. has the "ovipositor" equal to the last four segments in length, *testudinea* Loew equal to the last two, according to the original descriptions.

One female from San José, Trinidad Mts. (R. Dow), the prey of a wasp (*Polistes poeyi* Lep.) I take to be true *testudinea*. Other specimens from Habana, Jaronu, and Central Soledad.

18. *Eutreta* sp.

The MCZ has two females of this genus, one from Haiti and the other from Grenada, which seem to represent two distinct forms, related to the South American *E. sparsa*. It is very likely that the genus is widely distributed in the West Indies, and that further collecting will show the existence of several forms on the different islands.

19. *Icterica christophe* n. sp. (fig. 1).

This species will trace to *Icterica* in the generic keys now in use for American Trypetidae, and it may well be placed in that genus, at least until a more thorough investigation of the South American forms of the group can be made.

♀. The head is brown, with a black spot on each side between the antenna and the eye, and another, smaller, in the antennal groove. The front is flat, not convex as in *I. seriata*, shaped much as in *Paracantha*: a tendency shown in several species of *Icterica* related to *fasciata* Adams. The bristles, which are long and prominent, are black, arranged in much the way as in *I. seriata*: three lower orbitals; two upper, the second weak and colorless; the ocellar pair is well developed; the vertical pair is especially well developed, twice as long as any of the other head bristles. The occipitals are short, stumpy, white.

The thorax is brown, thinly covered with short, yellow hairs. There is a dark mediodorsal stripe, an indication of a subdorsal stripe, and a broad, less dark, band over the wing base. The legs are brown, concolorous with the thorax, with dark setae. The usual thoracic bristles are black, prominent, arranged much as in *I. seriata*. The mediodorsal stripe extends over the scutellum and includes the apical pair of bristles; the sides of the scutellum are lighter.

The abdomen is irregularly darker on the anterior margin of the segments, and is covered with whitish hairs. The tube is brown, tipped with black.

The wing has a dark brown ground color with small light spots—the *Eutreta* type of marking—with a broad white band across the middle, which begins in the second basal and anal cells, and extends to about the middle of the first posterior cell, where it ends in a point. This wing pattern, so far as I know, is found in no other American Trypetid; the nearest approach is *Icterica lunata* Hendel.

The costal margin is uniform brown except for an irregular white spot at the end of the first vein, a light point near the apex of the marginal cell, and a white spot just beyond the

end of the second vein. Except for their outer borders, the marginal and submarginal cells are covered with small light spots of varying size and shape, which continue across the first posterior cell, the apex of the discal cell and the base of the second posterior cell, the lower third of the third posterior cell and the apex of the auxiliary cell. The white median band of the wing fills the second basal and anal cells, cuts across the base of the third posterior cell, crosses the discal cell obliquely, covering about half its area, includes the lower part of the first basal cell, and extends into the base of the first posterior cell. The hind border of the wing is marked with white in several places: a band which includes the base of the 4th vein, a spot in about the middle of the second posterior cell, another band which begins just beyond this spot and extends to the middle of the third posterior cell, and several spots after that.

The venation agrees quite well with that of *I. seriata*. The first longitudinal vein is spinose, the second is slightly waved, the third is spinose for about the lower third of the first basal cell, distinctly bowed upward beyond the small cross-vein. The two cross-veins are placed much as in *I. seriata*, but the hind cross-vein is more oblique. The outline of the wing tip is not nearly so blunt as in *seriata*, and the hind margin is much more rounded, so that the wing does not have the oblong effect so characteristic of *seriata* and its allies.

Length of wing, 6.2 mm.; total body length, 6.5 mm.; length of tube, 1 mm.

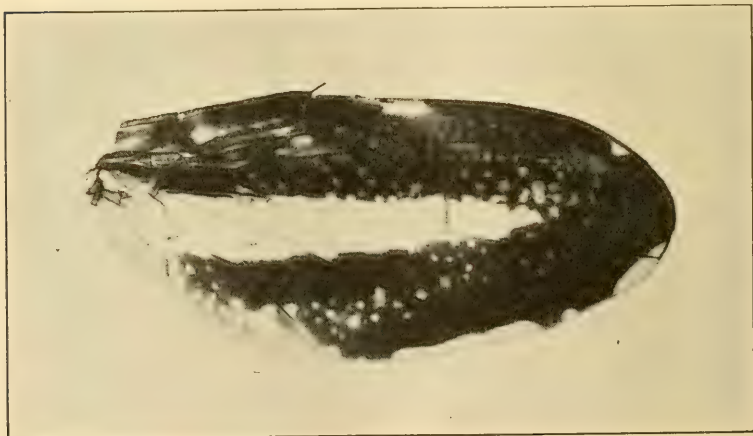


Fig. 1. *Ictericia christophe*, new species.

One female, type No. 17052, in the MCZ, from Port-au-Prince, Haiti, W. M. Mann.

20. *Ensina picciola* (Bigot)

Acinia picciola Bigot, 1857, p. 824, pl. XX, f. 10, 10a (Cuba).

Trypeta humilis Loew, 1862, p. 81, pl. II, f. 17; 1873, p. 291, pl. X, f. 17 (Cuba).

Ensina humilis Doane, 1899, p. 188 (Jam.); Wolcott, 1924, p. 229 (P. R.).

Ensina picciola Johnson, 1908, p. 78 (Bahamas); *id.*, 1919, p. 445 (Jam.); Gowdey, 1926, p. 87 (Jam.); Curran, 1928, p. 70 (P. R.).

Ensina chilensis (*part.*) Hendel, 1914, p. 65.

There are some 74 specimens in the MCZ and my collection from various localities in Jamaica, Cuba and the Bahamas. While it is quite possible that this little insect ranges all over tropical America, I feel that the name *picciola* should be retained until the relative status of the northern insect and *chilensis* can be definitely ascertained.

The larva lives in the flower heads of *Bidens* in Cuba.

21. *Ensina thomae* Curran

Curran, 1928, p. 70, f. 30 (St. Thomas).

I do not recognize this form in the specimens before me.

22. *Ensina peregrina* Loew

Loew, 1873, p. 292, pl. X, f. 30 (Brazil); Williston, 1896, p. 377, pl. XIII, f. 130 (St. Vincent); Wolcott, 1924, p. 229 (P. R.).

The MCZ has three specimens from Moneague and Mandeville, Jamaica, which seem to belong to this species.

23. *Tephritis fucata* (Fabr.)

Musca fucata Fabricius, 1794, p. 359 (Is. Am. Mer.).

Tephritis fucata Loew, 1873, p. 301 (Arg.); Doane, 1899, p. 189 (Jam.); Williston, 1896, p. 337, pl. XII, f. 129 (St. Vincent); Johnson, 1919, p. 445 (Jam.); Gowdey, 1926, p. 87 (Jam.).

Euribia fucata Hendel, 1914, p. 67, pl. III, f. 56; Phillips, 1923, p. 150, pl. XIX, f. 65 (Jam.).

There are four specimens of this species in the MCZ from Guantánamo, Cuba, and Kingston, Jamaica.

24. *Tephritis floccosa* Curran

Curran, 1928, p. 73, f. 31 (St. John).

I have not seen this species.

25. *Tephritis bruesi* new species (Fig. 2).

Tephritis finalis Johnson (*nec* Loew), 1919, p. 445 (Jam.);
Gowdey, 1926, p. 87 (Jam.).

This species may easily be distinguished from *finalis* Loew by the much shorter tube of the female, and the narrower wings, which have a complete brown band extending from the stigma to and over the hind cross-vein. Both *finalis* and *bruesi* seem to be close enough to *arnicae*, the type of *Tephritis*, to be congeneric, the principal difference being that the 3rd vein in *arnicae* is naked beneath, and that the front is somewhat wider, bearing only two convergent orbitals; other closely related species show intermediate conditions in these respects.

♀. The head is much as in *finalis* in general color and proportions. The front is somewhat narrower, with three well developed convergent orbitals; the verticals are perhaps stronger than is usual with *finalis*. The dorsum of the thorax is much as in *finalis*: black, covered with a greyish pollen and with fine white hairs; the bristles are long, dark, arranged as in *finalis*. The scutellum is brown, with both pairs of bristles well developed. The abdomen is black, each segment marked with light brown (the same shade as the tube and legs, a shade often called yellow) on its posterior margin: this light color being especially broad on the mediodorsal

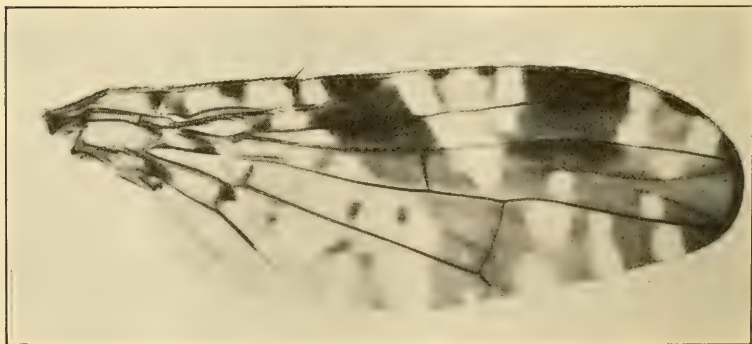


Fig. 2. *Tephritis bruesi*, new species.

line. The usual fine bristles are black. The last segment (tube) is light brown, trapezoid in shape, much shorter and more truncate than in *finalis*, lighter and more uniformly colored. The legs are light brown, much lighter than in *finalis*, and with light colored bristles and hairs.

The wing has the same general pattern as *finalis*, but the hyaline spots tend to be smaller and less numerous, making the wing darker. The uniform brown of the tip of the discal cell is a striking character, which may not hold good for all specimens, however. The wing of *bruesi* is noticeably narrower than *finalis*, the proportion of length to breadth in *finalis* being 12:4.5, and in *bruesi* 12:3.8. The costal margin of *bruesi* is nearly a straight line.

Length of wing, 4.6 mm.; total body length, 4.3 mm.; length of tube, 0.6 mm.

One female, Newton Jamaica, 3000 ft., Jan. 1912, C. T. Brues, from the collection of C. W. Johnson. MCZ Type No. 17053.

26. *Euaressta mexicana* (Wied.)

Trypeta mexicana Wiedemann, 1830, p. 511 (Mex.); Loew, 1873, p. 317, pl. X, f. 28.

Trypeta melanogastra Loew, 1862, p. 90, pl. II, f. 23 (Cuba); *id.*, 1873, p. 315, pl. X, f. 24.

Euaressta mexicana Hendel, 1914, p. 71; Wolcott, 1924, p. 230 (P. R.).

Euaressta melanogastra Hendel, 1914, p. 71; Johnson, 1919, p. 446 (Jam.); Williston, 1896, p. 377, pl. XIII, f. 131 (St. Vincent); Wolcott, 1924, p. 230 (P. R.); Gowdey, 1926, p. 87 (Jam.); Curran, 1928, p. 72 (P. R.).

Euaressta plesia Curran, 1928, p. 72, f. 29 (P. R.).

Dyseuaressta mexicana Hendel, 1928, p. 368.

This synonymy seems unavoidable, as I can find no constant characters to separate Central American and West Indian specimens. The position of the spot in the submarginal cell may be either under the basal marginal spot, between the two marginal spots, or in various intermediate positions, with no reference to locality. Similarly, Curran's *plesia*, as well as can be judged from his figure and very meagre description, falls well within the range of variation of *mexicana*; an examination of the type would be necessary to be sure of this, however. The presence or absence of the apical spot in the marginal cell seems to be of no significance whatever, as I have every sort of intergrade in my series.

There are some 26 specimens in the MCZ and my collection

from Jamaica, Cuba, the Bahamas, and Barbados, as well as numerous specimens from various continental localities.

27. *Euaresta obscuriventris* Loew

Loew, 1873, p. 313, pl. X, f. 26 (Brazil); Hendel, 1914, p. 73; Curran, 1928, p. 73 (P. R.).

Tetreuaresta obscuriventris Hendel, 1928, p. 368.

We have some 20 specimens from Jamaica and Cuba which seem to belong to this species. One specimen has an extra scutellar bristle: a not uncommon type of aberration in the family.

28. *Euaresta bella* (Loew)

Trypeta bella Loew, 1862, p. 88, pl. II, f. 23 (Wash., N. Y.).

Euaresta bella Johnson, 1908, p. 78 (Bahamas).

There are several specimens in the MCZ from the Bahamas.

29. *Trypanea abstersa* (Loew)

Trypeta abstersa Loew, 1861, p. 91 (N. Am.); *id.*, 1873, p. 322, pl. XI, f. 7 (Cuba).

The three Cuban specimens in the MCZ from the Loew collection are not types, but the specimens described by him in 1873. The 1861 type, from North America, is in the Winthem Collection. It is probable that the North American species passing currently under this name is the true *abstersa*, and that these Cuban specimens represent a distinct form: a question that cannot be settled without fresh West Indian material.

30. *Trypanea polyclona* (Loew)

Trypeta (Urellia) polyclona Loew, 1873, p. 324.

I have seen no West Indian material of this species except the type which, as pointed out by Loew, is in rather bad condition.

31. *Trypanea solaris* (Loew)

Trypeta solaris Loew, 1862, p. 84, pl. II, f. 19 (Ga.).

Trypeta (Urellia) solaris Loew, 1873, p. 325, pl. X, f. 19;

Williston, 1896, p. 377, pl. XIII, f. 132 (St. Vincent).

Trypanea daphne (part.) Hendel, 1914, p. 76.

Urellia solaris Wolcott, 1924, p. 230 (P. R.).

Trypanea mevarna Curran, 1928, p. 71 (P. R.).

We have 11 specimens of this species from various localities in Cuba, and Barbados. The identification of this form with *daphne*

of Wiedemann, described from Uruguay, needs confirmation. Walker's description of *mcvarna* reads more like *polyclona* than *solaris*, but its exact standing cannot be determined without an examination of the type.

32. *Trypanea dacetoptera* Phillips

Phillips, 1923, p. 148, pl. XIX, f. 59; Curran, 1928, p. 71 (St. Croix).

I have seen no West Indian specimens of this species, although we have a fair series from the eastern United States.

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THE FALL CANKER WORM *ALSOPHILA POMETARIA* PECK IN WESTCHESTER COUNTY, N. Y.

BY GEO. P. ENGELHARDT, Hartsdale, N. Y.

An unusually destructive outbreak of the Fall Canker Worm during May and early June caused great alarm and much annoyance to the inhabitants of Westchester County and adjoining regions crossing the state line into Connecticut.

Observing people were not surprised by this invasion, for in December and January the winged males and the wingless females of the moth appeared in countless numbers, covering tree trunks, fences and walls, thus predicting the outbreak of the so-called measuring or inch worms in the spring.

For several years at the meetings of the Brooklyn Entomological Society the writer has called attention to the ever-increasing numbers of the Fall Canker Worm in Westchester County. It is to be hoped that the outbreak in 1933 signifies a numerical climax, which in ensuing years will be followed by a steady decrease brought about by the attacks of parasites and bacterial diseases. Insectivorous birds can play only a minor part in combating a pest of such proportions.

The destruction wrought is evident by the number of defoliated trees and shrubs in woodlands, along shaded streets and in gardens. The principal sufferers are oak, elm, linden, ash, hickory, willow and apple trees. Remedial measures, the spraying with arsenate of lead of shade trees on streets and in gardens, as usual, were applied too late to do much good. The caterpillars were approaching maturity and most of the damage had been done. If nature does not step in to give a helping hand, man is practically helpless to deal with such a problem.

During the height of the caterpillar invasion it was impossible to pass under shade trees or through woodlands without finding oneself covered with the measuring worms suspended in myriads by silken threads from the branches above.

In the writer's garden the caterpillars showed decided preference for rambler roses, eating into or cutting off the developing flower buds. A young quaking aspen, one morning, showed itself almost completely defoliated. The leaves had been cut off cleanly, but not eaten, leaving only the bare stems on the tree.

It is to be expected that most of the trees will succeed in replenishing their foliage during the summer. Yet, unquestionably they have been weakened and a subsequent attack may have dire results.

Newspaper accounts have credited the caterpillar invasion to the Spring Canker Worm, *Palcacrita vernata*, an indigenous American species, closely resembling the introduced European Fall Canker Worm in larval and adult form. No doubt this species has contributed to the injury, but only in a minor part. The principal damage was done by the Fall Canker Worm, *Alsophila pometicaria*.

BOOK NOTES.

Fighting the Insects—The Story of an Entomologist, by L. O. Howard. (Pp. i-xvii + i-333. The Macmillan Company, N. Y. \$2.50.)

Dr. Howard completes in this recent work his trilogy. In the first work of the series, "A History of Applied Entomology," he tells of the origin, growth and progress of the economic side of the science, in which he is one of the great factors; and of the men who have made it a world-wide work of the greatest importance to mankind. In the second work, "The Insect Menace," he sets forth the vast problems with which it deals and the ways in which they have been solved or attacked. This third work tells us of Dr. Howard, the man, in his personal contacts. The three together reveal the personality of one of our great Americans. In his own modesty, he is unaware of this, but the vast importance of his fundamental work will become more and more evident to all in the unfaltering march of time.

His personal charm, his wit, his broad human spirit, his love of his fellows and their doings, appear on every page. We have now the full-length self-portrait of a MAN.

Today, in his nominal retirement, the activity of his keen and alert mind still infuses the Department which for so many years he led. To appreciate why this is so, read these three works. All who have the least secret thought of ranking in the science of entomology may well ponder them; and by thus learning to know the man they may set their own courses upward and onward.

Dr. Howard shows one gift above all others—his sympathetic understanding of his fellow-men. This is the true key to his eminence; added to this, he has the true scientist's unslakable thirst to *know* and to know exactly.

No American entomologist should be without these three indispensable contributions to the science by one who is a leader, in the truest way, in an aspect of science of basic importance to mankind and its welfare.

J. R. T.-B.

Jungle Bees and Wasps of Barro Colorado Island (Panama), by Phil Rau. Pp. (5 unnumbered) + i-324, figs. 1-100, 18 unnumbered illustrations, and 2 plates; Appendix by J. Bequaert, on Three New Species of *Polybia*, with figs. 1-3. (Phil Rau, Kirkwood, Mo. \$2.75.)

This is a most fascinating work, even to one who, like the writer, is interested only in the most unsocial, and even anti-social, of insects. Here we have a study of those insects in which instinct is the basis of purposive actions, so much so that in these bees and wasps we see instinct with deviations into intelligent and seemingly reasoned actions. May it not be that all instincts in origin are purposive, which by trial and error and habit have congealed into set patterns, from which in turn other instincts or automatic habits arise? Many of man's so-called instinctive or automatic reactions may have arisen in this way in the long-forgotten dawn of the race; and social memory has preserved them and handed them down as so-called tropistic or mechanistic habits.

"Jungle Bees" brings out these and many other psycho-biological facts. It adds materially to our knowledge of the ways of the social insects in their natural state and also of their adaptability to new and unknown conditions brought about by the handiwork of man.

The first five chapters deal with the Neotropical bees and wasps and their habits. Chapter VI refers to the ecology and behavior of spiders and of other insects, including records of observed species in sundry Orders. "The Fallen Sand-Box Tree and Its Insect Inhabitants," and "A Day at New Limon" form chapter VII. Chapter VIII is taken up with a discussion of the behavior of the Carpenter Bee and the origin of its instincts, of interest because it is a Tropical bee working its way North. Biological philosophy makes up Chapter IX, on mind as a forerunner of evolution, which ends Mr. Rau's fascinating work.

In an Appendix, Dr. Bequaert describes three new species of *Polybia*, heretofore unknown to science, on which certain of Mr. Rau's studies were made. But, Mr. Rau describes the structure of their nests and their habits, under the names given by Dr. Bequaert, in the fore part of the book. Now, a nice question arises, to be solved by the finesse of our entomological precisians. Since an insect may be (and has been) described by its galls or other structures, may not Mr. Rau in this aspect, and quite unwittingly, be the valid namer of these undescribed species mentioned by him, by page priority? This question is set for the benefit of our entomological illuminati.

The work is carefully indexed and excellently printed, with the fine illustrations from photographs.

Dr. W. M. Wheeler says of this work: "It is in my opinion one of the most outstanding recent contributions to natural history. . . .

It will undoubtedly rank among the leading works on instinctive behavior of insects."

No words of ours could more fittingly, and above all, more authoritatively characterize this splendid work.

J. R. T.-B.

Insects—Man's Chief Competitors, by W. P. Flint and C. L. Metcalfe. (Pp. i-viii + 1-133, figs. 1-12. The Williams & Wilkins Co., Baltimore, Md. \$1.)

This is one of the volumes of the Century of Progress Series published by this house.

The second paragraph of this brief but informing work states its entire purpose and content in these words: "During the past one hundred years man has learned more about insects than during any other corresponding period in the world's history. Discoveries of the greatest importance to the material prosperity and to the health of the human race have been made during this century."

"This book is intended to set forth some of the important facts concerning insects and some of the interesting things about their lives."

In lucid and entertaining style these authors set out in twelve chapters how insects fight man and how man fights insects; the structure and life of insects, and then discuss seven of the many insects which affect our well-being and our future as a race.

The work is of necessity brief, yet sufficient for the purpose intended—a busy non-entomologist can read it in a couple of hours. Our wife, who has been exposed to entomology for many years, says that it has given her the first real idea of what it is all about, and very entertainingly, too. This is a real dictum from a sample of the public at which it is aimed, and with great success, in this writer's estimation.

All those with contagion-resistant families and friends might well recommend it to them. They can't help reading it when they get it—if for no other reason, in order not to waste their dollar.

J. R. T.-B.

PROCEEDINGS OF THE SOCIETY.

MEETING OF DECEMBER 15, 1932.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday, December 15, 1932, at 8.20 p. m.

President Davis in the Chair and ten other members present, viz., Dr. M. D. Leonard, Messrs. Engelhardt, Lemmer, Moennich, Nicolay, Schaeffer, Sheridan, Siepmann, Torre-Bueno and Wurster, and three visitors, Messrs. Pollard, Ragot and Stecher.

The minutes of the previous meeting were read and approved. Mr. Engelhardt presented the monthly report of the treasurer and Mr. Torre-Bueno presented a preliminary report on a new edition of the Glossary.

Mr. Davis read an article reporting the death of our Honorary Member, Dr. W. J. Holland, at the age of 84 years. A general discussion on the work of Dr. Holland followed and a resolution that the secretary be instructed to write a letter to the family of the deceased expressing the sympathy and sorrow of the society was unanimously adopted.

Mr. Davis appointed a nominating committee to consist of Messrs. Lemmer, Nicolay and Moennich.

Mr. Schaeffer said that he had looked over the Coleoptera in the collection of the late Charles J. Martin, which had been presented to the Children's Museum. The collection contained three specimens of *Leptura emarginata*, from three different Long Island localities: East New York, Forest Park and Jamaica. This species was not recorded from Long Island in the New York State List, but two records had since been recorded, one from the Weeks Collection and one collected by Mr. Latham (see BULLETIN, XXVII, 213). There was also a specimen of *Adalia frigida* variety *humeralis*, from Bedford, New York. This is a new record for the state; although the species is recorded in the New York State List, the earlier records were based upon misdeterminations, as mentioned at the November meeting of the society.

Two other specimens of interest are in the Martin Collection: a specimen of a Cassidinid beetle labelled East New York, and a series of six specimens of a species of *Glischrochilus*, labelled Bedford, New York, neither of which agree with any species known from North America.

Mr. Wurster exhibited some beautiful chrysalides of the Japanese *Papilio alcinous*, which look like manufactured ornaments

rather than dormant insects. He also showed a *Polyphemus* cocoon spun to a *Cecropia* cocoon, collected out-of-doors.

Dr. Leonard said that about eight years have elapsed since the New York State List closed, in which time a great many additions have come to light. He said that it would be a good plan to publish a complete list of all the additions, published and unpublished, in some entomological journal, when ten years shall have passed.

Mr. Davis spoke on the swarming habits of the ant *Lasius claviger*, of which a note will be published separately in the BULLETIN. He also exhibited portion of a pouch or communal cocoon spun by an African species, probably *Anaphe*.

Mr. Torre-Bueno presented the paper of the evening, on his trip to the Catskill Mountains in search of Heteroptera. Most of his collecting was done in the vicinity of Hunter and Tannersville, and on Onteora Mountain, N. Y. He illustrated his talk with specimens taken during the trip.

Mr. Engelhardt again referred to the fall canker worm, *Alsophila pometaria* (see minutes for December, 1930, and December, 1931) and said that this species was now becoming a real pest in Westchester County, thousands of specimens being seen in the woodlands.

The meeting adjourned at 10.10 p. m.

CARL GEO. SIEPMANN,
Secretary.

MEETING OF JANUARY 12, 1933.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday, January 12, 1933, at 8.15 p. m.

President Davis in the chair and twelve other members present, *viz.*, Messrs. Ballou, Cleff, Engelhardt, Lacey, Lemmer, Moennich, Nicolay, Schaeffer, Sheridan, Shoemaker, Siepmann, and Torre-Bueno, and five visitors, Mrs. Moennich, and Messrs. Erb, Fish, Hollander, and Stecher.

The minutes of the previous meeting were read and approved. Mr. Engelhardt presented the annual report of the treasurer and spoke at length on the progress of the society. The report of the publication committee for 1932 was presented by Mr. Torre-Bueno.

An article on the late Dr. W. J. Holland was read by Mr. Engelhardt, which will be published separately in the BULLETIN. A

letter from Mr. Moorhead B. Holland, the son of Dr. Holland, was read by the secretary.

Mr. Torre-Bueno exhibited a copy of a new book by W. S. Blatchley, entitled "In Days Agone," which contains much information concerning Florida collecting grounds and the habits of Floridan insects.

The nominating committee, represented by Mr. Lemmer, presented the following recommendations for the coming year: President, William T. Davis; Vice-President, J. R. de la Torre-Bueno; Treasurer, George P. Engelhardt; Recording Secretary, Carl Geo. Siepmann; Librarian, Charles Schaeffer; Curator, J. M. Sheridan; Delegate to the N. Y. Academy of Sciences, George P. Engelhardt; Publication Committee, J. R. de la Torre-Bueno, George P. Engelhardt, and Carl Geo. Siepmann.

Mr. Torre-Bueno proposed the name of Mr. Lemmer for Corresponding Secretary.

There being no further nominations, it was moved and seconded that the nominations be accepted as proposed, which was accordingly done.

Mr. Lemmer proposed for membership Mr. David Hollander, 1415 Wythe Place, Bronx, N. Y. C. Mr. Hollander being present, it was regularly moved and seconded that the By-laws be suspended, and the secretary was directed to cast one ballot for his election, which was accordingly done.

Mr. Davis exhibited some Coccinellidae collected by Mr. Roy Latham at Orient, L. I., including three new records for Long Island: *Anisocalva quatuordecimguttata*, *Anisocalva duodecimmaculata*, and *Exochomus marginipennis* variety *latiusculus*. Mr. Latham also obtained a specimen of *Neoharmonia venusta* at Northwest, L. I., which is not recorded in the State List, but which had recently been taken by K. W. Cooper at Flushing, L. Lacey at Pelham, and H. Moennich at Little Neck.

Mr. Davis exhibited a number of cocoons, some of which had been pierced by the downy woodpecker and sucked dry. He observed that only cocoons which were attached to fair sized branches which did not give way when the woodpecker started to drill, had been opened. The cocoons which were attached to comparatively slender twigs could not be opened by the woodpeckers. Mr. Davis also exhibited a collection of Colorado Cicadas, of which there are now 29 species, six more than were known at the time Mr. Davis wrote his bulletin about them. Only three of the Colorado species also occur in the East.

Mr. Engelhardt read a letter from Mr. E. Irving Huntington, expressing his desire to resign from the society; the matter was left in the hands of the treasurer to be taken up again at the next meeting.

Mr. Torre-Bueno exhibited some rare water bugs which he had received from Dr. Bequaert, collected in Guatemala. A separate note will be published elsewhere. The insects exhibited considerable variation in color, and Mr. Torre-Bueno pointed out that color was a very unreliable character for the identification of water bugs.

Mr. Engelhardt showed a specimen of the Japanese *Papilio alcinous*, only recently emerged from a chrysalis presented to him by Mr. C. Wm. Wurster. In the warm temperature of Mr. Engelhardt's office the beautiful butterfly hatched on January 1st.

Mr. Engelhardt also showed a series of Aegeriids or clear-wing moths, which biologically may be termed the wild buckwheat borers, all western in distribution. Of the four species exhibited, only one, *Synanthedon polygona* Hy. Edw., heretofore had been connected with its food plant, *Polygonum paronychia*, discovered by that keen observer, F. X. Williams. Last summer the second species, *Synanthedon praetans* Hy. Edw., was bred by the entomologists of the U. S. Experiment Station at Puyallup, Washington, from the crown roots of *Eriogonum compositum*, another wild buckwheat. To the unique male type three females have now been added. The third species, *Synanthedon fragerin* Hy. Edw., ranges from California northward through British Columbia to Alaska and the fourth, *Synanthedon helianthi* Hy. Edw., is not uncommon in the Rocky Mountain regions. The last two species have not been bred as yet and will be subjects of investigation by Mr. Engelhardt on a collecting trip to the Pacific Coast next summer.

The meeting adjourned at 10.15 p. m.

CARL GEO. SIEPMAN,
Secretary.

Long Island Records of Heteroptera.—In 1930, Mr. Kenneth W. Cooper secured the following bugs at Flushing, L. I., N. Y.: Four *Amaurochrous cinctipes* Say on March 15; one *Aradus robustus* Uhler on March 9; and one each *Cryphula parallelograma* Stål on March 15, *Heracus plebejus* Stål and *Scolopostethus atlanticus* Hórváth, March 9. The first two seem to be new records for Long Island, as they do not appear in the State List as from that locality.—J. R. DE LA TORRE-BUENO, White Plains, N. Y.

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DECEMBER, 1933

No. 5

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

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PUBLICATION COMMITTEE

J. R. de la TORRE-BUENO, Editor

CARL GEO. SIEPMAN

GEO. P. ENGELHARDT

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NEW LONGICORN BEETLES OF THE SUBFAMILY LAMIINAE (COLEOPTERA, CERAMBYCIDAE).

By E. GORTON LINSLEY, Oakland, Calif.

The following descriptions are offered preliminary to a revision of the tribe Pogonocherini which is now in preparation. At least two of the species have been wrongly understood and it seems advisable to correct the synonymy of these and make known certain other new species at this time. It is felt that the majority of our species which have been previously placed in *Pogonocherus* are not congeneric with the Old World members of this genus and are more correctly referable to *Poliaenus* Bates. The forms described below are therefore placed in the latter genus.

Poliaenus batesi Linsley, n. sp.

Robust, subcylindrical, dark brown, clothed with rather sparse, short, grayish-white and brown pubescence, intermixed with longer, scattered, flying hairs. Head pubescent with white and brownish hairs; antennae fuscous, annulated, distinctly longer than the body; scape slender, third segment slightly longer than scape, remaining segments diminishing in length toward apex. Prothorax transverse, lateral and discal tubercles prominent, obtuse. Elytra about twice as long as broad, convex; lateral costae distinct, evanescent at base, median costae evanescent at apical third, subsutural costae indicated only by the prominently crested sub-basal tubercle, and small tufts of setae at apical third; pubescence pale brown and white, the latter predominating in discal and ante-median areas; the hair pencils of darker brown mixed with orange; puncturation coarser and more distinct in basal region; apices rotundate-truncate. Legs fuscous, clothed with long pale hairs. Length 9 mm., breadth 3.3 mm.

Type, female, S. Gerónimo, Guatemala (Champion), in the collection of the British Museum of Natural History, London. The

writer is indebted to Mr. K. G. Blair for permission to study this species.

This species is near *P. hirsutus* Bates, but differs from that species in size, coloration, puncturation, and in the shape of the elytral apices. In *P. hirsutus*, the legs and antennae are pale rufescent, and the hair pencils of the elytra brownish. In *P. batesi* the inner angle of the elytral apices is distinctly rounded and the pubescence of the elytra much more sparse and the puncturation, as a result, more conspicuous. *P. batesi* also resembles *P. negundo* (Schffr.), but in the latter species the elytral costae are less distinct, and the scape of the antennae shorter.

***Poliaenus schaefferi* Linsley, n. sp.**

Pogonocherus vandykei Schaeffer, Bull. Brook. Ent. Soc. XXVII, 1932, p. 153.

Pogonocherus californicus Van Dyke, Bull. Brook. Ent. Soc. XV, 1920, p. 46; Linsley, Pan-Pacific Ent. VII, 1930, p. 83.

This species which has stood in collections for many years as *Pogonocherus californicus* has been recently described by Mr. Schaeffer as *P. vandykei*. The latter name is unfortunately preoccupied, and is here re-named *schaefferi* as a slight tribute to Mr. Schaeffer for his many contributions to our knowledge of this group.

Poliaenus schaefferi is near *P. obscurus* (Fall), but the elytral puncturation is less coarse and the dark markings and tufts or erect setae are more numerous and more conspicuous.

***Poliaenus albidus* Linsley, n. sp.**

Pogonocherus concolor Van Dyke, Bull. Brook. Ent. Soc. XV, 1920, p. 46; Linsley, Pan-Pacific Ent. VII, 1930, p. 84.

Robust, subcylindrical, piceous, densely clothed with a uniform grayish-white pubescence, with longer, scattered, flying hairs on head, antennae, legs, and entire upper surface. Head finely, densely pubescent; antennae annulated, slightly longer than the body in the female, distinctly so in the male; scape moderately slender, third segment slightly longer than scape, remaining segments diminishing in length toward apex. Prothorax broader than long, about two-thirds as wide as elytra at base; lateral and discal tubercles large, obtuse; pubescence fine, dense, intermixed with flying hairs. Elytra about twice as long as broad; lateral costae feeble, inner costae scarcely evident except where emphasized by small tubercles armed

with tufts of erect black hairs; pubescence uniformly gray or gray and black. Body beneath, covered with grayish-white pubescence. Legs clothed with alternating bands of gray and white pubescent; third tarsal segment padded beneath with dense yellow hairs. Length 5-9 mm., breadth 1.5-3 mm.

Type, male (No. 3729 Calif. Acad. Sci.) and allotype, female (No. 3730 Calif. Acad. Sci.), collected by the writer at Havilah, Calif., May 16, 1930, from dead branches of *Pinus sabiniana*. Paratypes: Havilah, Calif., May 16, 1930; Mt. Diablo, Calif., April-May, 1931; Cedar Mtn. Ridge, Alameda Co., Calif., May, 1931; and Pope Valley, Napa Co., Calif., May, 1932, in the collections of Dr. E. C. Van Dyke, Mr. A. T. McClay, and the writer.

This species has long been known as *Pogonocherus concolor* Schffr., but the latter species has no long erect hairs on the head or pronotum and the lateral tubercles of the prothorax are much more acute at the apex. *P. concolor* also has no tufts of erect black hairs on the elytra and all of the tarsal segments are clothed beneath with dense yellow hairs. *Poliaenus albidus* is much nearer *P. schaefferi* and *P. obscurus* (Fall), but in these last two species the pubescence is much sparser, darker, the markings more conspicuous, and the elytra more coarsely punctured. In addition the antennae are clothed with long brown and whitish hairs (in *albidus* these hairs are uniformly white).

Poliaenus vandykei (Linsley), subsp. **grandis** Linsley, n. subsp.

I have before me two examples of *P. vandykei* from Southern Mexico, that agree with the type in most important structural characters, but differ in size, coloration and pubescence. The Mexican specimens are much more conspicuously marked, and the pubescence is much more dense and of a darker brown than the Texan example. These characters and the difference in distribution seem to warrant the giving of a subspecific name to this form.

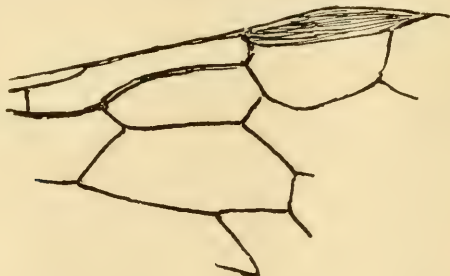
Type, male (No. 3731 Calif. Acad. Sci.) and allotype, female, in the collection of the writer, collected at Tejupilco, Mexico, alt. 4000-6000 ft., July, 1932, by Mr. Howard Hinton, who very kindly presented the specimens to me for study. This is the largest and most robust of the known members of this genus. Measurements: Type, length 11.5 mm., breadth 4.7 mm., allotype, length 10 mm., breadth 3.5 mm.

Authors are urged to read our statement of policy in this number.

A FOSSIL SAWFLY FROM THE MIOCENE SHALES NEAR CREEDE, COLORADO.

BY T. D. A. COCKERELL, Boulder, Colo.

It has been known for some time that in the vicinity of Creede, Colorado, there are extensive exposures of Miocene shales similar to those of Florissant. Creede is the county seat of Mineral County, and is 8,840 feet above sea-level. It is almost a hundred miles from Florissant. Knowlton, in 1923, published an account of a small collection of plants from this Creede formation, recognizing in the flora several of the characteristic Florissant species. Now Mr. Allan Caplan, a senior in the Creede High School, has been fortunate enough to find fossil insects, and has been good enough to send me a very interesting species, herewith described.



Cephaleia caplani.
details of venation

Cephaleia caplani n. sp. (Pamphiliidae.)

Length 14 mm., parallel-sided; abdomen about 8 mm. long and 4 wide; width of head 3 mm.; anterior wings about 9.5 mm., hyaline, with brown veins and stigma; the abdomen as preserved is light brownish fulvous; legs brown. The venation agrees with *Cephaleia*, and compared with MacGillivray's figure (Proc. U. S. Natl. Mus., XXIX, pl. XXVI, f. 42 (*C. abietis*)) it shows the following characters (following the nomenclature of Rohwer and Gahan, 1916):

Intercalaris about the same, but narrower at point of origin of vein to subcosta (Sc. 2 of MacGillivray), the latter vertical; stigma about the same; first cubital cell considerably more elongate, being about 2 mm. long and .7 wide (deep);

first radial similar to that figured, but longer; first discoidal considerably longer (length 2 mm.), with the lower basal angle less than a right angle, and the face on brachial conspicuously longer; lower apical angle of submedian cell considerably more produced and acute; anterior and posterior sides of upper part of brachial cell parallel. The upper part of the head is divided into three approximately equal parts by strong grooves; the same grooves are very evident in the living *Neurotoma fasciata* Norton.

This insect belong to a primitive group of sawflies, peculiar to the Northern Hemisphere. Two somewhat related species (*Ato-cus defessus* Scudder and *Neurotoma cockerelli* Rohwer) have been found fossil at Florissant. The larvae of *Cephaleia* are known to live on coniferous plants, which are especially well represented in the fossil flora of Creede.

EUERYTHRA PHASMA HARVEY IN MISSOURI (LEP. HET., ARCT.).

BY EDWIN P. MEINERS, M.D., St. Louis, Mo.

* The only published records of the distribution of *Euerythra phasma* that I am able to find are contained in Dyar's List¹ and an article by John B. Smith.² Both of these give the state of Texas as the locality wherein it is to be found. It may, therefore, be of interest to record the fact that I have six specimens of this pretty Arctiid which were captured in the vicinity of St. Louis, Mo. Two males and a female were taken on May 28, 1932, resting on the twigs of a small red cedar (*Juniperus virginiana*) on the grounds of the Missouri Botanical Garden Extension at Gray Summit, Mo. Three other specimens taken at Meramec Highlands, St. Louis County, Mo., on the following dates: April 3, 1904; April 18, 1909, and April 23, 1911. All are fresh specimens apparently just emerged.

Both of the above mentioned localities are situated on the Meramec River which, with its surrounding hills, forms the boundary of the northern slope of the Ozark uplift. It would be of interest to hear of other records so far north.

¹ Bulletin 52, U. S. N. M.

² Proc. U. S. N. M., X, 1887.

ON TWO SPECIES OF *LUDIUS* (COLEOPTERA).

BY H. C. FALL, Tyngsboro, Mass.

Ludius rufopleuralis n. sp.

Something like forty years ago Dr. John Hamilton, in an article in the Canadian Entomologist entitled "Notes on Coleoptera No. 6," in concluding some remarks on *Corymbites nigricornis* Panz. wrote as follows: "From the more southern parts of Canada and from Massachusetts comes a form with a narrow margin and the hind angles of the thorax, the inflexed sides, the prosternal lobe, the epipleura of the elytra, sides of the abdomen and narrow posterior margin of the central segments rufous; the feet varying in color as in the typical forms. Except in color there appears to be no other separative, but this is so striking that it is not obvious, without some study, that the forms are all one thing."

Most of the color characters mentioned by Hamilton affect only the under side, and viewed casually from above this form may easily be confused with either *nigricornis* or *aratus*, with both of which in fact it is mixed in the Le Conte collection.

Quite recently Mr. Frost brought me one of the specimens with red propleura for an expression of opinion. It had been identified for him by Blanchard many years ago as "*nitidulus*" and more recently by Hyslop as "*nigricornis* var. *nitidulus*." I found similar specimens in my *aratus* series, but critically examined they did not look right there and further study instead of leading me to the conclusion that "the forms are all one thing" as Dr. Hamilton puts it, convinces me that this particular form with the red propleura is specifically distinct from both *aratus* and *nigricornis* (*metallicus* Payk.; *nitidulus* Lec.).

The color characters of this species, for which I propose the name *rufopleuralis*, are well stated by Hamilton, though it should be said that the side margin of the thorax and the hind margins of the ventral segments are in some specimens scarcely at all paler, and in addition it may be mentioned that in most examples the front margin of the pronotum is narrowly dull rufous. The sides of the abdomen are usually rather narrowly but sometimes much more broadly reddish.

None of these color characters exist in *nigricornis*, while in *aratus* only the prosternal lobe and the epipleura are distinctly reddish in fully colored examples; the hind angles of the thorax showing occasionally vague indications of a paler tint. Nor is it true as Hamilton intimates that color is the only separative. As

compared with *rufopleuralis*, *aratus* is as a rule slightly larger and more robust and of duller lustre; the pronotal punctuation is perceptibly coarser and closer, especially antero-laterally; the third antennal joint is noticeably longer than the fourth, whereas in *rufopleuralis* the third and fourth joints are equal or very nearly so. In both species the sides of the thorax are rather strongly rounded before the middle, in distinction from *nigricornis*, in which the sides are more oblique in front. *Nigricornis* is also smaller than *rufopleuralis*, the pronotal punctuation still sparser and finer and scarcely at all coarser or closer at sides than at middle, the third and fourth antennal joints are nearly equal in length, as they are in *rufopleuralis*. On the whole *rufopleuralis* appears to me to be closer to *aratus* than to *nigricornis* and its proper position is between these two species.

The 16 examples of *rufopleuralis* studied vary in length from 10.2 to 11.3 mm. They are from Quebec (Montreal and Berthierville), and various points in Maine, New Hampshire and Massachusetts. Of the three examples in the Le Conte collection one is without locality and the other two are labeled Detroit and "Can." The type is from Tyngsboro, Mass., and bears date 7-30-16.

The principal distinguishing characters of the three species above considered are for convenience tabulated below.

KEY.

Prothorax strongly rounded in front, as wide before the middle as at base of hind angles.

Pronotal punctuation a little coarser and denser, especially at sides; propleura entirely dark; 3rd antennal joint evidently longer than the 4th; size generally a little larger, surface less shining *aratus*

Pronotal punctuation somewhat finer and at sides notably less dense; propleura entirely rufous; 3rd antennal joint not longer than the 4th; size as a rule a little smaller and surface more shining *rufopleuralis*

Prothorax not strongly rounded in front, the sides anteriorly more oblique, the width before the middle less than at base of hind angles.

Pronotal punctuation finer and sparser than in the above species, not appreciably closer laterally than at middle; propleura aeneo-piceous throughout; 3rd and 4th antennal joints equal in length; size generally smaller ... *nigricornis*

In Dr. Van Dyke's table of *Ludius* in his recent California Academy of Sciences paper (Vol. XX, March, 1932) his charac-

terization of *aratus* does not fit that species but applies in most respects to *rufopleuralis*.

Ludius appressus Rand.

Not long since I received from Mr. C. A. Frost among other things sent for determination a black Elaterid which looked strange to me. It was about 11 mm. in length, broad, depressed, and posteriorly inflated. I judged it to be a *Ludius* but there was nothing among my black *Ludii* anything like it, nor could I find anything in the literature corresponding to it. The specimen bore the label "Wallface Mt., N. Y.; 12-VII-1922; Quirsfeld." I promptly sent Mr. Quirsfeld a letter of inquiry, to which he replied as follows: "I have made a number of attempts to find a name for it but my efforts were never crowned with success. However I have fostered a wild opinion that the thing may be the female of Randall's *appressus*, of which I have only seen male examples." He adds the further information that "Wallface Mt. is located in Essex Co., New York, and is a peak rising from Indian Pass directly opposite Mt. Macintyre. The specimens (three altogether) were taken at an elevation of about 3,500 feet, in dense spruce woods, all resting on ferns in company with *appressus* and species of the subgenus *Eanus*. To the best of my knowledge Howard Notman and I are the only ones who succeeded in making any captures. How many Notman took I cannot say but I do know that his specimens were found under similar circumstances, although in another part of the Adirondacks. I believe they were collected on Mt. Marcy."

Although I had not suspected any such relationship, Mr. Quirsfeld's "wild guess" at once impressed me as possessing elements of sanity, and was favored by the fact that he found at the same place and under similar conditions specimens of typical *appressus*, all of which were males, while his black examples were all females. A comparison of the black female with my specimens of *appressus* shows that they are identical in their structural features, notably so in the strongly flexed tip of the prosternal intercoxal process, a rare character in *Ludius* proper, while the broader more depressed and posteriorly widened form of the black examples is merely a marked instance of a type of sexual divergence exhibited by the females of many species.

In quest of further information I wrote to Mr. Notman. His reply came from Tucson, Arizona, and being away from his collection he was only able to say "I think I have more than one

specimen and that they were taken in the Moss Pond region near the summit of Mt. Marcy."

Mr. Liebeck writes me from Philadelphia that he has been able to find and examine 16 specimens altogether in various collections, that they are all of the typical form and all males so far as he is able to judge. He says: "I searched all through the *Ludius* and boxes of odds and ends in Elateridae at the Academy but there is nothing like the example you submitted."

From Washington Mr. Fisher writes: "I have examined our material of the genus *Ludius* and find that we have 10 examples of the typical form in regard to color and markings of *appressus* Rand. All of these examples were collected by Hubbard and Schwarz, eight at White Fish Point, Lake Superior, and two at Marquette, Michigan. Nine of these examples are males and the other is probably also a male but the abdomen is in such a position that I could not extract the genitalia. I have looked over the collection as you suggested for specimens of the black form which might be erroneously placed under some other species, but did not find a single example."

The Le Conte collection at Cambridge contains only two examples of *appressus*, both of the typical form and both males. The Blanchard, Bowditch and general collections of the museum do not contain a single specimen of either sex. In my own collection are six specimens of typical *appressus* and all are certainly males.

From a consideration of the above facts the astonishing inference may be drawn that all specimens of *Ludius appressus* in collections are males, and that in the nearly one hundred years since Randall described the species the female, if taken at all, has never before been recognized. If any one has the necessary evidence to controvert this rather incredible assumption the writer would be glad to see it published or to be personally so informed. Even if females of the typical form should be found it would still be true that we have in *L. appressus* an instance of sexual dichromatism as remarkable as it was unexpected.

Ludius appressus has always been a comparatively rare species and most of the examples known to me in collections are from very few sources. Randall described the species from Maine in 1838 but I have no knowledge of its having since been found there. There are in my collection two examples taken by the late Mr. Emerton, the spider specialist, on Mt. Mansfield, Vermont. The remainder of my specimens, and according to Mr. Liebeck nearly all those in the Philadelphia collections, were distributed

back in the '90's by Mr. Frank S. Daggett, who once took them in some numbers in "washup" on the shore of Lake Superior at Duluth, Minnesota. As already stated all the specimens in the National Museum collection were taken by Hubbard and Schwarz at White Fish Point and Marquette on the south shore of Lake Superior, and Le Conte's type of *mirificus* (1850) came from Eagle Harbor, an intermediate point on the same south shore. To these records we must now add Quirsfeld's and Notman's captures in the higher parts of the Adirondacks. It would certainly seem that the species should also occur in the White Mts. of New Hampshire but it is not on any available White Mt. list and I know of no one who has taken it there.

(Since writing the above I learn from Mr. Frost that he has a specimen taken on Mt. Washington.)

The Sting of a Tarantula Wasp.—Our largest Hymenoptera are the large Psammocharid wasps of the genus *Pepsis*, commonly known as "Tarantula hawks." As they successfully overpower the so-called Tarantulas (*Eurypelma* and related genera) in the Southwest, one might surmise that their stings would be formidable. The largest Texas species is *Pepsis nephele* which reaches a length of 63 millimeters. A large individual of this species stung me on the tip of the second finger of the left hand as I was removing it from the net (College Station, Texas; June 21, 1932; 5.45 p. m.). The pain was sharp at first, followed by a gradual swelling of the finger. By 7.30 p. m. there was little pain, but the distal portion of the finger had become definitely swollen; by 10.30 p. m. the swelling had extended to the back of the hand; and by the next morning, the entire hand and wrist had become swollen. By afternoon, the swelling had extended up the forearm to within two inches of the elbow and had become by this time rather painful. No measures whatever were taken to relieve the condition, as it was not considered serious. The swelling continued during the next day, and although still painful and throbbing on the third day, it began to go down rapidly and by the fourth day was nearly back to normal, although there was considerable itching. By the fifth day this also had disappeared. I must admit, however, that I am susceptible to insect poisons, and in justice to the insect I might say that probably some of the naturalists who have been in the habit of subjecting themselves experimentally to the effects of venomous insects, would have been little inconvenienced by the experience.—STANLEY W. BROMLEY, Columbus, Ohio.

SOME MORDELLIDAE (COLEOPTERA) OF IOWA PRAIRIES.¹

BY GEORGE O. HENDRICKSON, Ames, Iowa.

This list is an addition to previous papers by the author (1930a, b) which are surveys of the insects of the prairies of Iowa.

Thanks are due to Mr. Emil Liljeblad for determinations of these species of *Mordellidae*.

Mordellistena erratica Smith.

At *Andropogon scoparius*-*Bouteloua curtipendula* (beard grass-mesquite grass) association, 1 mile west of Hamburg State Park, July 30, 1928, one specimen.

Mordellistena cervicalis Lec.

Swept from flowers of *Erigeron ramosus*, 1 mile south of Amana, June 23, 1928, one specimen.

Mordellistena aspersa Melsh.

Chiefly at *Stipa spartea*-*Andropogon scoparius* (needle grass-beard grass) association, June 23-Aug. 6, 1928; several stations.

Mordellistena infima Lec.

At *Andropogon scoparius*-*Bouteloua curtipendula* association, 4 miles south of Westfield, July 26, 1928, one specimen.

Mordellistena pustulata Melsh.

Chiefly at *Stipa spartea*-*Andropogon scoparius* association, June 23-30, 1928; several stations.

Mordellistena unicolor Lec.

Chiefly at *Stipa spartea*-*Andropogon scoparius* association, June 30-Aug. 9, 1928; several stations.

Mordellistena suturella Hellm.

Swept from flowers of *Silphium laciniatum*, July 9, 19, 1928, three specimens.

LITERATURE CITED.

- Hendrickson, George O. 1930a. Studies on the Insect Fauna of Iowa Prairies. *Iowa State Jour. Sci.* 4: 49-179.
———. 1930b. Further Studies on the Insect Fauna of Iowa Prairies. *Iowa State Jour. Sci.* 5: 195-209.

¹ Contribution from Department of Zoology and Entomology, Iowa State College.

THE GENUS FITCHIELLA (HOMOPTERA, FULGORIDAE).

PAUL B. LAWSON, Lawrence, Kans.¹

The name *Fitchiella* was given by Van Duzee in 1917 to the Fulgorids of the genus *Naso* Fitch because the latter name was found to be preoccupied. The name *Naso* referred to the swollen apex of the head process as found in the species *robertsoni* and *fitchi*. *F. melichari*, however, while clearly allied to the preceding species, does not have this swollen process. This character, therefore, cannot be considered as of generic value. A striking and definite generic mark, however, is present in the flattened fore and middle tibiae, which coupled with the produced head, makes the genus a readily recognized one.

Five new species, which lack the swollen process but have the flattened tibiae, are described in this paper.

KEY TO SPECIES OF FITCHIELLA.

1. Head process knobbed at apex2
 Head process not knobbed at apex3
2. Light species marked with black, females 4 mm. long; fore and middle tibiae slightly expanded *robertsoni* Fitch.
 Brownish species, females 5 mm. long; fore and middle tibiae greatly expanded *fitchi* Melichar.
3. Front with longitudinal white stripe *albifrons* sp. n.
 Front entirely dark4
4. Venter of head process and most of legs reddish.
 *rufipes* sp. n.
 Venter of head process black and legs (except in *minor*) usually entirely black5
5. Head process very large and quadrate apically.
 *grandis* sp. n.
 Head process smaller and rounded apically6
6. Head process quite short; fore tibiae reddish ... *minor* sp. n.
 Head process longer; fore tibiae usually dark7
7. Head process longer; fore tibiae very wide ... *melichari* Ball
 Head process shorter; fore tibiae narrower ... *mediana* sp. n.

Fitchiella albifrons sp. n. (Fig. 1, 1a.)

A black species with front and legs marked with white.
 Length, female 3 mm.; male 2 to 2.5 mm.

¹ Contribution from Department of Entomology, University of Kansas.

Head produced into rather long process which is bent downward at about a 45 degree angle, its ventral margin straight half way to eyes; not swollen apically. Front with strong lateral carinae, median carina faint at base but strong apically where it is continuous with apical margin of process; a row of pustules laterad of lateral carinae and a short row just cephalad of eyes. Vertex very short. Pronotum nearly three times as wide as long, with distinct median carina and many pustules. Scutellum with three strong carinae laterad of which are many pustules. Elytra short and reticulated, distinctly longer in male than in female. Abdomen with dorsal median carina and with two rather definite rows of pustules on each segment laterally. Fore and middle tibiae expanded but not as strongly as in some other species. Last ventral segment of female triangular; posterior margin somewhat produced and truncate on median half.

Color: Black above, except for light frons which has all three carinae dark, a faint continuation of this light line on to pronotum and scutellum; eyes tinged with red. Mostly black below except sometimes for brown sides of head process, pale spots on legs and distinctly white dorsal margins of tibiae, especially first two pairs.

Holotype, female, and male *allotype*, Santa Rita Mts., Ariz., July 17, 1932, R. H. Beamer. *Paratypes*: One male and two females, same data; two females, July 18, 1931, and July 11, 1932, Santa Rita Mts., Ariz., E. D. Ball.

Last two paratypes in Dr. Ball's collection; other types in Snow Entomological Collection.

This species is smaller than *F. melichari*, the head process is straighter below apically, the front is distinctly more concave and the white markings of the front and legs seem characteristic.

***Fitchiella rufipes* sp. n. (Figs. 2, 2a.)**

A black species with head process and legs tinged with reddish. Length, female 3.25 to 4 mm.; male 2.75 to 3 mm.

Head produced into rather long process which is bent downward at about a 45 degree angle, its apex more rounded than in preceding species, its ventral margin straight half way to eyes; not swollen apically. Front with three carinae, the middle one continuous with apical margin of process; a row of pustules laterad or lateral carinae and a short row cephalad of eyes. Vertex very short. Pronotum twice as wide as long, with median carina and covered with pustules. Scutellum with three carinae laterad of which are many pustules. Elytra short in both sexes. Abdomen with indistinct median carina and with lateral pustules. Fore tibiae

very greatly expanded; middle tibiae somewhat less so. Female last ventral segment triangular, posterior margin somewhat produced and truncate along median half.

Color: Black, tinged with bronze. Lower half of head process and first two pairs of legs down to upper third of tibiae reddish. Hind legs pale, tinged with red to near end of tibiae; rest of tibiae and tarsi black.

Holotype, female, and male *allotype*, Zion National Park, Utah, Aug. 13, 1929, R. H. Beamer. *Paratypes*: two females, above data; female, Oak Creek Canyon, Ariz., Aug. 14, 1927, R. H. Beamer; two males and two females, Kanab, Utah, E. D. Ball; female, Provo, Utah, Aug. 10, 1930, E. D. Ball; three females, Granite Dell, Ariz., Aug. 16, 1929, E. D. Ball; two females and a male, Granite Dell, Ariz., Aug. 17, 1929, E. D. Ball.

Specimens taken by Dr. Ball in his collection; all other type specimens deposited in Snow Entomological Collection.

This species is close to *F. melichari* but the head process is not so angulate below, the fore tibiae are relatively larger being the largest in the genus, and the reddish color of the head process and legs seems characteristic.

Fitchiella mediana sp. n. (Figs. 6, 6a.)

A black species close to *F. melichari* but with head process shorter and with fore tibiae smaller. Length, female 3 to 4 mm.; male 2.5 to 3 mm.

Head process moderately long, not swollen apically, rounded in female, somewhat obliquely truncate in male, ventral angle sharp and cephalad of half the distance to eye. Front with median carina distinct for its entire length. Vertex very short. Pronotum slightly over twice as wide as long, median carina distinct, with many pustules. Scutellum longer than pronotum, with three distinct carinae, lateral portions with many pustules. Elytra short and reticulated, relatively longer in male than in female. Abdomen with dorsal median carina rather distinct and with few pustules laterally on each segment. Last ventral segment of female triangular; posterior margin somewhat produced and truncate on median half.

Color: Nearly uniformly black. Eyes sometimes reddish and parts of legs pale.

Holotype, female, and male *allotype*, Sabino Canyon, Ariz., June 14, 1932, R. H. Beamer. *Paratypes*: Three males, same data; three males, same data except taken on June 12, 1932; female, Tucson, Ariz., Mar. 22, 1931, E. D. Ball; male, Tucson,

Ariz., Apr. 2, 1929, E. D. Ball; two females, Bisbee, Ariz., Oct. 14, 1931, E. D. Ball; two males, Baboquivari Mts., Ariz., July 16, 1932, E. D. Ball; female, Baboquivari Mts., Ariz., June 9, 1932, E. D. Ball.

Types from Sabino Canyon deposited in Snow Entomological Collection; all others in Dr. Ball's collection.

This species seems to stand between *F. melichari* and the following species.

Fitchiella minor sp. n. (Figs. 3, 3a.)

A black species close to *F. mediana* but with shorter head process and with reddish fore and middle tibiae. Length, female 3.75 mm.

Head process quite short, ventral notch cephalad of middle of distance to eye. Front with median carina fading out at base. Vertex very short. Pronotum about twice as wide as long, with strong median carina and many pustules. Scutellum longer than pronotum, with three carinae and many lateral pustules. Elytra short and reticulated. Fore and middle tibiae distinctly smaller than in *mediana*. Last ventral segment of female triangular; posterior margin produced and truncate on median half.

Color: Black, with suggestion of white stripe along sutural margin of elytra. Fore and middle tibiae reddish.

Holotype, female, Tucson, Ariz., Mar. 10, 1931, E. D. Ball.

Type in Dr. Ball's collection.

This species has the shortest head process in the series of closely related species composed of this, *F. mediana* and *F. melichari* (Fig. 5), the last having the longest process. This species also has the smallest fore tibiae of the three, with *melichari* (Fig. 5a) having the largest.

Fitchiella grandis sp. n. (Fig. 4, 4a.)

A black species with very large, apically quadrate, head process. Length, female 4.25 mm.

Head process very large and truncate apically, straight ventrally fully half way to eyes. Front very large and wide, extending almost to tip of head process, median carina not strong, fading out on basal third. Vertex very short. Pronotum a little over twice as wide as long, median carina distinct, with many pustules. Scutellum longer than pronotum, tricarinate, lateral portions pustulate. Elytra short and reticulated. Fore and middle tibiae not as large relatively as in *melichari*. Posterior margin of last ventral

segment of female slightly produced on median half which is slightly concave.

Color: Black, except for few light markings on legs.

Holotype, female, Santa Rita Mts., Ariz., Alt. 4500 ft., Sept. 9, 1925, A. A. Nichol.

Type in Dr. Ball's collection.

This species is easily recognized by its very large, apically quadrate, head process.

The writer is indebted to Dr. Ball for the loan of specimens for study, including the type of *F. melichari* which is here figured.

The drawings figure the lateral views of the head and the fore tibia of the several species.

LEPIDOPTERA RECORDS FROM ORIENT, LONG ISLAND, N. Y.

Archips georgiana. Orient, August 17, 1927. One bright specimen at light.

Loxostege helvialis. Orient, Greenport, Bridgehampton, and Montauk; August 3, 1932, to October 1, 1924, at Orient. All at light.

Loxostege commixtalis. Montauk, East Hampton, Orient, and East Marion; common in Orient in 1932, July 4 to September 30, six to over fifty coming to light during certain nights in August and September.

Loxostege dasconalis. Three-mile Harbor, July 9, 1928. Sandy field.

Rhodoneura myrsusalis. Montauk, July 26, 1927. At light. Fresh specimen.

Cirrhrololina mexicana. Orient, July 9, 1928. At light. Faded specimen.

Melipotis fasciolaris. Montauk, June 17, 1926. At light. Condition of specimen indicates a stray.

Fagitana littera. Orient. Four specimens, all at light. June 17, 1932, to August 17, 1927. All freshly emerged individuals.

Lepipolys perscripta. Greenport, September 1, 1929. At automobile light in woods.

Oligia bridghami. Montauk, Bridgehampton, Greenport, and Orient; August 4, 1927, Montauk, to September 7, 1927, Orient. All at light.—ROY LATHAM, Orient, Long Island, N. Y.



1 *F. albifrons*



1a



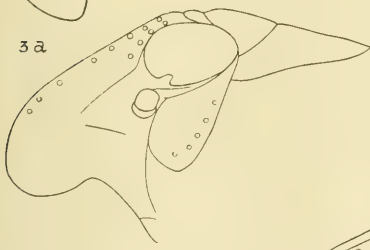
2 *F. rufipes*



2a



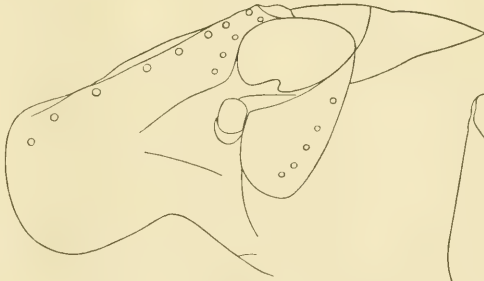
3a



3 *F. minor*



4a



4 *F. grandis*



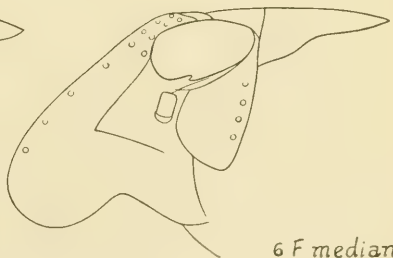
6a



5a



5 *F. melichari*



6 *F. mediana*

PTINUS TECTUS BOIELDIEU IN AMERICA.

BY MELVILLE H. HATCH, Seattle, Wash.

Ptinus (*Gynopteris*) *tectus* Boieldieu, Ann. Soc. Ent. Fr. (3) IV, 1856, p. 652.—Beare, Ent. Mo. Mag. XL, 1904, p. 4, 85.—Champion, *ibid.*, p. 85.—Heyden, Reitter, and Wiese, Cat. Col. Eur. ed. 2, 1906, p. 425 (subg. *Ptinus*).—Fowler, Col. Brit. Isl. VI, 1913, p. 146, pl. xv, fig. 12.—Koltze in Reitter, Fauna Germ. Käf. V, 1916, p. 316.—Winkler, Cat. Col. reg. pal. 1927, p. 811 (subg. *Pseudobruchus* Pic).—Joy, Handb. Brit. Beetles, 1932, p. 455.—? *pilosus* White (nec Müll., 1821), Voyage Ereb. Terror XI, 1846, p. 8.—Broun, Man. New Zeal. Col. I, 1880, p. 338.—Pic, Col. Cat. 41, 1912, p. 35.—*ocellus* Brown, Can. Ent. LXI. 1929, p. 109.

BIONOMY: Durrant and Beveridge, Il. Roy. Army med. Corps (London) XX, 1913, p. 615.—Walker, Ent. Mo. Mag. LI, 1915, p. 18.—Scholz, Ent. Blätt. XVI, 1920, p. 23–24; XXIX, 1933, p. 42.—Carpenter, Econ. Proc. R. Dublin Soc. II (15), 1920, p. 259–272 (IX, 153).¹—Bur. Bio-Technology Leeds, Bull. 2, 1921, p. 52 (IX, 145).—Knapp, Bull. Imp. Inst. London XIX, 1921, p. 189–200 (X, 21).—Zacher, Die Umschau, Frankfurt a. M. XXVI (5), 1922, 4 pp. (X, 443); Verh. Deutsch. Ges. angew. Ent. 3 Mitgliederversamml. Eisenach 28. bis. 30. Sept. 1921, 1922, p. 55–59 (XI, 131); 5 Mitgliederversamml. Hamburg 16. bis. 20. Sept. 1925, 1926, p. 68–69 (XIV, 437); Die Vorrats-, Speicher- und Materialschädlinge und ihre Bekämpfung (Berlin) 1927, p. 111.—Theobald, Ann. Rep. Res. and Adv. Dept. S. E. Agric. Coll. 1926–27, 16 pp. (XVI, 148).—von Lengerken, Mitt. Ges. Vorratschutz V (22), 1929, p. 21–26, 2 figs. (XVII, 428); Z. angew. Ent. XIV, 1929, p. 450–460, 8 figs.; XV, 1929, p. 639, fig. (XVIII, 187).—Munro, Rep. on Ins. Infestations of Stored Cacao, E. M. B. 24, 1929, 40 pp. (XVIII, 176).—Patton, Ins., Ticks, Mites and Venomous Animals of Medical and Veterinary Importance II, 1931, p. 492–493, fig. 267.—Hatch, Ins. Pest Surv. Bull. XIII, 1933, p. 27.

Probably originating in Tasmania, this pest is now known from Australia, New Zealand (Broun), Tierra del Fuego and Falkland

¹ These references in parentheses refer to the volume and page of the Review of Applied Entomology, Series A, where an abstract of the paper cited may be found.

Islands (K. G. Blair), Chile, Jamaica, Grenada and Dominica in the West Indies, west Africa, Natal, Afghanistan, Smyrna, Great Britain (since 1901), and Ireland and Germany (since 1916) (Patton). Under the name of *ocellus* it was recorded from Victoria in British Columbia in 1928 by Brown, and I have taken it recently in Seattle, Washington: a single specimen without further data in February, 1930, and an extensive series from a warehouse on the waterfront in October, 1932. Accompanying the latter were lesser numbers of *Trigonogenius globulus* Sol. and an occasional specimen of *Ptinus fur* L.

Ptinus tectus Boield. has been recorded from a considerable series of dried organic products: cayenne pepper, chocolate powder, dessicated soup, cacao, nutmegs, almonds, ginger, figs, sultanas, dried pears, dried apricots, beans, rye, fish food, maize, casein (Patton), stored hops (Theobald), poultry food and paprika pepper (von Lengerken), fish meal (Brown). It has been found in granaries, ware-houses, bakers' shops, and biscuit factories, and eating holes in carpets in Ireland (Patton).

According to the accounts of Scholz, von Lengerken, and Patton, four or five months are required for the life cycle. In Europe the eggs are said to be laid in early summer, the larvae spin cocoons and pupate in September and October and normally emerge in early spring. In warm buildings, however, they appear to emerge in numbers between October and December, but whether such adults oviposit at once or wait until summer is not indicated.

This species has been misreferred by Heyden, Reitter, and Weise to the subgenus *Ptinus* and by Winkler to the subgenus *Pseudobruchus* Pic. Its affinities appear, rather, to be with the members of the subgenus *Gynopterus* Muls. characterized by the similar form of the elytra in the two sexes. It has, however, the sides of its elytra somewhat more broadly rounded than do most of the other species placed in this subgenus. In Fall's key to the Nearctic species of this subgenus (Trans. Am. Ent. Soc. XXXI, 1905, p. 112-114) *tectus* runs to category "2," whereupon it is distinguished from all the Nearctic species of the subgenus by the absence of setae from the punctures of the elytral striae. From most of our species it is further distinguished by the uniform reddish yellow pubescence of the elytra, the intervals each with a median series of longer more erect setae of the same color, the elytra devoid of subbasal or subapical spots of paler vestiture. Length 2.5-4 mm. The details of Mr. Brown's excellent description need not be repeated. Figures of the adult are given by Fowler and by Patton.

ACKNOWLEDGMENTS: To Mr. K. G. Blair, of the British Museum of Natural History I am indebted for the identification of my Seattle specimens and for distributional notes; to Mr. W. J. Brown I am indebted for paratypes of *ocellus*; to Dr. H. C. Fall I am indebted for suggestions.

XYLORYCETES SATYRUS.

BY ROY LATHAM, Orient, Long Island, New York.

During the gale of November 10, 1932, a large thirty-year-old white lilac, *Syringa vulgaris*, shrub was uprooted on the lawn of my home in Orient, Long Island. Intermingled amongst the earth, decayed root-wood of the lilac, and the roots of the lawn sod were the remains of approximately 200 Rhinoceros beetles, *Xyloryctes satyrus*. This insect is reported as injurious to ash. The lilac is in the Oleaceae, Olive family, which includes the *Fraxinus*, Ash. The genus *Fraxinus* is represented in Orient, as far as I can discover, by a single cultivated tree of *Fraxinus americana*. The lilac is common in cultivation throughout Orient and also persists as an escaped species.

Xyloryctes is very local in Orient. It has been common in the vicinity of where this uprooted lilac grew, for twenty years, swarming in large numbers during the month of July and early August. The swarming usually starts about July tenth. They commence to fly just before dark and continue for about two hours, the numbers gradually diminishing. The humming or buzzing caused by their flight can be distinguished from that of the several *Lachnosterna* which are usually in flight at the same time. They are attracted commonly to lights. They have varied in abundance from year to year, and were comparably uncommon in 1932.

My observations in other parts of eastern Long Island indicate *Xyloryctes* to be localized and rare. *Fraxinus* grows as a native in Greenport and Southold, its range in that section being a continuation of the same colony of trees. I have not recorded *Fraxinus* elsewhere on the eastern end of Long Island. *Syringa*, of course, is cultivated commonly throughout all of Long Island.

As for *Xyloryctes*.—This large, handsome coleopteron may be injurious where it is present in great numbers; however, it does not appear to be generally common enough to cause serious damage to *Syringa*, this very popular flowering shrub on the eastern half of Long Island.

NEW RECORDS OF LEPIDOPTERA FROM
NEW YORK.

BY ALEXANDER B. KLOTS, University of Rochester.

The following records are mostly the result of collecting done around Rochester during the past year, but a few are of old captures, now finally determined. In view of the fact that comparatively little collecting has been done in the past around Rochester, there are many new records for this locality. Rochester records of generally distributed species have been omitted.

The number of records of Southern species is noteworthy, and significant to a student of the distribution of eastern North American insects. It is apparent that New York State has been populated by immigration from the South along two main routes, the first up the coastal strip and into the state by way of the New York City region and Long Island, the second up the Mississippi and Ohio drainages and into the state by way of Buffalo. Rochester is directly in the path of this second wave of dispersal; as a result we would expect to find here, and indeed do, more traces of a Southern fauna than to the East or South. There is still an enormous amount of work to be done in tracing out the exact ranges of most of our New York insects, and Rochester is at a strategic point for some of the most interesting of this work.

As in former years the type of record has been indicated by a prefixed abbreviation, "state" signifying that the record is of a species not hitherto recorded from New York, "local" signifying that the record is from a locality in New York from which the species has not hitherto been recorded, and "!" signifying a record of other unusual interest. The Barnes and McDunnough Checklist numbers have also been given.

A great many of the species here recorded were collected by Drs. A. Glenn Richards, Jr., and J. D. Hood, and Messrs. E. A. Maynard, R. C. Lewis and R. L. Post. The records for the *Noc-tuoidea* were prepared by Dr. Richards and are based largely on specimens determined by him.

Family INCURVARIIDAE.

local 8471 *Tegeticula yuccasella* Rly. Rochester, 7 Aug.

Family EUCLEIDAE.

local 4816 *Euclea delphinii* Bdv. Rochester, 17 July.

local 4839 *Cochlidion biguttata* Pck. Rochester, 2 Aug.; Lakeville, 12 Jly.

local 4841 *Cochlidion y-inversa* Pck. Rochester, 23 Jly., 2 Aug.

Family TINEIDAE.

local 8241 *Monopis dorsistrigella* Clem. Rochester, 9 June-9 July.

local 8242 *Monopis crocicapitella* Clem. Rochester, 5-12 Sept.

local 8238 *Monopis biflavimaculella* Clem. Rochester, 7 Aug.

state 8309 *Diachorisia (Homosetia) cristatella* Chamb. Ithaca, 26-30 June, 1931.

local 8234 *Xylesthia pruniramiella* Clem. Rochester, 13 July.

Family OPOSTEGIDAE.

local 8419 *Opostega albogaleriella* var. *quadristrigella* Chamb. Rochester, 3 & 8 July.

Family GRACILARIIDAE.

local 7991 *Acrocercops astericola* F. & B. Rochester, 3 July-7 Aug.

state 7972 *Cremastobombycia solidaginis* F. & B. Rochester, 27 July.

local 7923 *Lithocolletis ostensackenella* Fitch. Rochester, 16 June.

Family COLEOPHORIDAE.

local 7762 *Coleophora coruscipennella* Clem. Rochester, 17 July-7 Aug.

Family OECOPHORIDAE.

local 6426 *Psilocorsis obsoletella* Z. Rochester, 5-16 June.

local 6449 *Agonopteryx pulvipennella* Clem. Rochester, 22 July-31 Aug.

local 6478 *Depressaria heracliana* DeG. Rochester, 28 July.

local 6642 *Ethmia longimaculella* Chamb. Rochester, 26 June.

local 6490 *Schiffermuelleria argenticinctella* Clem. Rochester, 12 July.

local 6499 *Oecophora newmanella* Clem. Canandaigua, 18 June.

Family XYLORICTIDAE.

local 6606 *Stenoma schlaegeri* Z. Rochester, 31 July.

Family GELECHIIDAE.

- local 6236 *Gelechia fluvialella* Bsk. Rochester, 12-28 June.
 local 6122 *Gnorimoschema gallaesolidaginis* Rly. Rochester, 31 Aug.-17 Sept.
 local 6361 *Trichotaphe alacella* Clem. Rochester, 11 Aug.
 state 6357 *Trichotaphe serrativittella* Z. Rochester, 3 & 8 July.
 local 6362 *Trichotaphe purpureofusca* Wals. Rochester, 18 June.
 local 6351 *Anorthosia punctipennella* Clem. Rochester, 13 June-9 July.
 local 6185 *Duvita nigratomella* Clem. Rochester, 22 June.
 local — *Duvita tahavusella* Fbs. Rochester, 26 June & 9 July.
 local 6182 *Stomopteryx palpilineella* Chamb. Rochester, 6-31 July.
 local 6040 *Glauce pectenalaecella* Chamb. Ithaca, 18 June, '31.
 local — *Aristotelia roseosuffusella* auct. nec Clem. Rochester, June-July, common.
 local 6052 *Aristotelia absconditella* Walk. Rochester, June-July.
 state 6044 *Aristotelia rubidella* Clem. Ithaca, 20 June, '31.
 state 6045 *Aristotelia fungivorella* Clem. Rochester, 18 June.
 local 6135 *Recurvaria apictripunctella* Clem. Rochester, 28 July.
 local 6160 *Epitheatia attributella* Walk. Rochester, 4 & 6 July.
 local 6062 *Evippe prunifoliella* Chamb. Rochester, 31 July.
 local 5972 *Helice (Theisoa) constrictella* Z. Rochester, 26 June.

Family LAVERNIDAE.

- local 5989 *Lymnaecia phragmitella* Stt. Rochester, June-July.
 local 6008 *Lophoptilus eloisella* Clem. Rochester, 13 June-6 July.
 local 5998 *Psacaphora luciferella* Clem. Ithaca, 23 June, '31.
 The first definite record for the state.

Family YPONOMEUTIDAE.

- local 7723 *Yponomeuta multipunctella* Clem. Rochester, 28 July; Morton, 18 July.
 local — *Cerostoma xylostella* L. Rochester, 30 July.
 local 8080 *Scythris eboracensis* Z. Rochester, 16 June; Canandaigua, 18 June.

Family AGERIIDAE.

- local 6681 *Conopia albicornis* H. Edw. Lakeville, 14 June.

Family TORTRICIDAE.

- state — *Hemimene (Pammene) felicitana* Heinr. Rochester, 16 & 18 June.

- state 7214 *Laspeyresia* (*Grapholitha*) *angleseana* Kf. Rochester, 18 June, very common.
- local 7210 *L.* (*Grapholitha*) *interstinctana* Clem. Canandaigua, 18 June.
- local 7216 *L.* (*Grapholitha*) *eclipsana* Z. Rochester, 16 June, very common.
- local 7253 *Ecdytolopha insiticiana* Z. Rochester, 18 June, 6 July.
- local 7174 *Achylopera nubeculana* Clem. Rochester, 5-18 June.
- local 7178 *Achylopera semiovana* Z. Canandaigua, 16 June.
- state — *Achylopera mira* Heinr. Ithaca, 28 May & 8 June, '30.
- state 6957 *Epiblema suffusana* Z. Rochester, 5 July.
- local 6981 *Epiblema strenuana* Walk. Rochester, 18-22 June.
- local 7014 *Epiblema scudderiana* Clem. Rochester, 20 June-8 July.
- state 6914 *Eucosma mandana* Kf. Rochester, 18-22 June.
- state 6973 *Eucosma zomonana* Kf. Rochester, 6 July & 7 Aug.
- local 6880 *Eucosma robinsonana* Grt. Rochester, 12 & 22 June.
- local 7036 *Eucosma sombreana* Kf. Rochester, 9-23 July.
- local 6394 *Eucosma cataclystiana* Wlk. Rochester, 22 June-28 Aug.
- local 6917 *Eucosma pergandeana* Fern. Rochester, 18-22 June.
- local 7029 *Eucosma dorsisignatana* Clem. Rochester, Aug.
- local — *Eucosma derelicta* Heinr. (= *juncticiliana* auct. nec Wals.). Rochester, 28 July-7 Aug.
- local 7065 *Thiodia striatana* Clem. Rochester, 5 June.
- local 7062 *Thiodia imbridana* Fern. Rochester, 28 Aug.
- local 7061 *Thiodia olivaceana* Rly. Rochester, 26 June.
- state 7074 *Thiodia kiscana* Kf. Rochester, 18 June.
- local 6971 *Sonia constrictana* Z. Rochester, 3 July-7 Aug.
- local 7130 *Proteoteras aesculana* Rly. Rochester, 26 June.
- state — *Gretchina derelictana* Heinr. Ithaca, 20 May & 13 June, '30.
- local 6992 *Exentera improbana* f. *oregonana* Wals. Rochester, 16 Apr.
- state 6790 *Bactra furfurana* Haw. Rochester, 26 June.
- local 6869 *Olethreutes bipartitana* Clem. Rochester, 26 June-7 Aug.
- local 6865 *Olethreutes glaciana* Mosch. (in State List as *fuscalbana* Z.). Canandaigua, 18 June.
- local 6864 *Olethreutes* (*Badebecia*) *urticana* Huebn. (in State List as *campestrana* Z.). Rochester, 12 June; Canandaigua, 18 June.

- local 6853 *Olethreutes albolineana* Kf. (in State List as *abictana* Fern.). Rochester, 21 June.
- state 6861 *Olethreutes (Endothenia) antiquana nubilana* Kf. Rochester, 20 Sept.
- local 6859 *Olethreutes duplex* Wals. Rochester, 18–22 June.
- local 6847 *Olethreutes chionosema* Z. Rochester, 26 June.
- local 6827 *Olethreutes hebesana* Walk. Rochester, 5 June–17 Sept.
- local — *Olethreutes variegana* Huebn. Rochester, 9 July.
- local 6873 *Phaenasiophora niveiguttana* Grt. Rochester, 9–28 June.
- local 6799 *Cymolomia (Exartema) olivaceana* Fern. Canandaigua, 18 June.
- local 6801 *Cymolomia (Exartema) punctana* Wals. Rochester, 6 July.
- local 6806 *Cymolomia (Exartema) exoleta* Z. Rochester, 2 Sept.
- state — *Cymolomia (Exartema) furfuranum* McD. Ithaca, 17 June.
- local 7303 *Sparganothis irrorea* Rob. Rochester, 9 June.
- local 7296 *Sparganothis diluticostana* Wlsm. Rochester, 9 June.
- local 7294 *Sparganothis reticulatana* var. *gracilana* Wls. Rochester, 22 July.
- local 7281 *Coelostathma discopunctanum* Clem. Rochester, 26 June.
- state 7415 *Peronea oxycoccana* Pck. Rochester, 29 Oct., common.
- local 7377 *Cnephasia virescana* Clem. Rochester, 31 July.
- local 7390 *Eulia velutinana* Wlk. Rochester, July.
- local 7399 *Eulia juglandana* Fern. Rochester, 3–8 July.
- local 7398 *Eulia quadrifasciana* Fern. Rochester, 2–13 July.
- local 7363 *Archips conflictana* Wlk. Lakeville, 3 July.
- local 7356 *Archips fractivittana* Clem. Rochester, 9 June.
- local 7342 *Archips persicana* Fitch. Lakeville, 3 July.
- local 7341 *Archips dissitana* Grt. Otsego Lake (Charles Stearns).
- local 7353b *Archips mortuana* Kf. Rochester, 9 July.
- local 7357 *Archips melaleucana* Wlk. Canandaigua, 18 June.
- local 7336 *Pandemis limitata* Rob. Rochester, 13 June–8 July.

Family THYRIDIDAE.

- local 4888 *Thyris maculata* Harr. Oswegatchie, 12–18 June.

Family PYRALIDIDAE.

- local 5297 *Condylolomia participialis* Grt. Rochester, 28 July.
 local 5450 *Paralipsa terrenella* Z. Rochester, 3 July.; Lakeville,
 3 July.
 local 4900 *Glaphyria sesquialis* Huebn. Rochester, 8–29 July.
 local 4902 *Glaphyria psychicalis* Hlst. Rochester, 6–14 July.
 local 4901 *Glaphyria lentiflualis* Z. Rochester, 29 July.
 state 4912 *Lipocosma eripalis* Grt. Rochester 14 July.
 local 4914 *Lipocosma fuliginosalis* Fern. Rochester, 9–14 July.
 local 5444 *Dicymolomia julianalis* Wlk. Rochester, 7 Aug.
 local 4955 *Blepharomastix ranalis* Guen. Rochester, 16 June &
 6 July.
 local 4956 *Blepharomastix stenialis* Guen. Rochester, 9 July.
 local 4960 *Pantographa limata* G. & R. Sodus Point, 25 July.
 local 4974 *Eudiotis nitidalis* Cr. Rochester, 14 Sept.
 local 5005 *Crocidophora serratissimalis* Z. Rochester, 9 June.
 local 5031 *Loxostege sticticalis* L. Rochester, 9 June–12 Sept.
 local 5064 *Tholeria reversalis* Guen. Rochester, 23 July.
 local 5103 *Cindaphia bicoloralis* Guen. Rochester, 28 June–Aug.
 local 5132 *Phlyctaenia fumalis* Guen. Rochester, 7–15 Aug.
 local 5125 *Pyrausta illibalis arsaltealis* Wlk. Oswegatchie, 13
 June.
 local 5140 *Pyrausta unifascialis subolivalis* Pck. Canandaigua,
 18 June.
 local 5155 *Pyrausta ochosalis*, Holl. Rochester, 5 June.
 local 5152a *Pyrausta subsequalis* var. *madestialis* Wlk. Roches-
 ter, 6 July.
 local — *Bocotarcha demantrialis* Druce, Rochester, 28 July.
 local 5178 *Thelcteria pupula* Hbn. Rochester, 3 June–9 July.
 local 5206 *Nymphula gyralis* Hulst. Rochester, 9 July–17 Sept.
 local 5217 *Elophila fulicalis* Clem. Rochester, 26 June–6 Aug.;
 Lakeville, 28 June; Morton, 18 July.
 local 5225 *Geshna primordialis* Dyar. Rochester, 1 July; Can-
 andaigua, 18 June.
 local 5238 *Scoparia penumbralis* Dyar. Canandaigua, 18 June.
 local 5255 *Pyralis disciferalis* Dyar. Rochester, 9 June.
 local 5250 *Aglossa cuprina* Z. Rochester, 15–20 July.
 local 5268 *Herculia olinalis* Guen. Rochester, 3 July.
 local 5430 *Chilo plejadellus* Zinck. Rochester, 2 Aug.
 local 5421 *Argyria auratella* Clem. Rochester, 18 July.
 local — *Argyria critica* Fbs. Rochester, 9, 14 & 22 July.
 local 5403 *Thaumatopsis pexella* Z. Rochester, 5 Sept.

- local ——— *Crambus biguttellus* Fbs. Rochester, 9 June.
 local 5467 *Epipaschia superatalis* Clem. Rochester, 8 July.
 local 5720 *Euzophera semifuneralis* Wlk. Rochester, 13 June.
 local 5835 *Peoria approximella* Wlk. Rochester, June–Aug.
 common.

Family EPIPLEMIDAE.

- local 4790 *Calledapteryx dryopterata* Grt. Otsego Lake (Charles Stearns).

Family GEOMETRIDAE.

- state 4387 *Macaria orillata* Wlk. Ithaca, 17 July, '31.

Family NOTODONTIDAE.

- local 3611 *Odontosia elegans* Strkr. Oswegatchie, 9 June, '31.

Family NOCTUIDAE.

- local 3574 *Anepischetos minualis* Gn. (in State List as *A. citata* Grt.). Rochester, 20 June, '31.
 local 3474 *Melanomma auricinctaria* Grt. Rochester, 9 & 12 July.
 local 3472 *Spargaloma sexpunctata* Grt. Rochester, 4 & 28 July.
 local 3473 *Spargaloma perditalis* Wlk. Rochester, 7 July–7 Aug.
 state 3469 *Oxycilla panatella* Sm.. Rochester, 6 July (det. F. H. Benjamin).
 local 3532 *Renia sobrialis* Wlk. Rochester, 9 July.
 local 3513 *Hormisa litophora* Grt. Rochester, 18 Aug.
 local 3515 *Hormisa orciferalis* Wlk. Resort, 23 July, '31. Coll. by J. D. Hood. First definite record for the State.
 local ——— *Epizeuxis diminuendis* B. & McD. Rochester, 7 Aug.
 local 3359 *Anticarsia gemmatilis* Hbn. Rochester, 28 Sept.
 local 3285 *Abrostola formosa* Grt. Rochester, 20 June.
 local 3284 *Paleoplusia venusta* Wlk. Rochester, 29 Aug.–27 Sept.; Sodus Point, 31 July & 5 Aug.
 local 3281 *Pseudeva purpurigera* Wlk. Rochester, 15 July; Sodus Point, 25 July.
 local 2791 *Archanara oblonga* Grt. Sodus Point, 12 Sept.
 state 2693 *Papaipema nelita* Strkr. Rochester, 15 Aug., '31 (det. Henry Bird).
 local 2662 *Papaipema speciosissima* G. & R. Rochester, 8 & 14 Sept. (det. Henry Bird).
 local 2654 *Rhodoecia aurantiago illiterata* Grt. Rochester, 7 & 12 Aug.

- local 2643 *Xanthoecia buffaloensis* Grt. Rochester, 5 Sept.
 local 2649 *Gortyna immanis* Gn. Rochester, late Aug.-Sept.
 local 2483 *Acronycta (Apatela) populi* Rly. Lakeville, Livingston Co., 30 July.
 local 2433 *Acronycta (Apatela) connecta* Grt. Rochester, 7 Aug.
 local 2454 *Acronycta (Apatela) caesarea* Sm. Ithaca, 9 June; Rochester, 12 July.
 local 2359 *Eremobia claudens* Wlk. Sodus Point, 30 Aug. & 1 Sept.
 local 2356 *Agroperina lutosa* Andr. Rochester, 3 July.
 local 2341 *Oligia exhausta* Sm. Lakeville, 17 July, '27.
 local 2343 *Oligia includens* Wlk. Rochester, 9 July.
 local 2339 *Oligia diversicolor* Morr. Rochester, 16 July & 12 Sept.
 local 2312 *Trachea enigma* Sm. Ithaca, 7 June, '30.
 state 2264 *Septis plutonia* Grt. Ithaca, 12 July, '30 (coll. A. E. Brower).
 local 2241 *Pyrophila glabella* Morr. Rochester, 7 Aug.
 local 2034 *Oncocnemis saundersiana* Grt. Lake Otsego (Charles Stearns).
 local 1734 *Polia vicina* Grt. Rochester, 29 July.
 local 1596 *Cryptocala gilvipennis* Grt. Rochester, 17 & 26 July.
 local 1504 *Adita chionanthi* S. & A. Rochester, 21 Sept.
 local 1438 *Noctua rubifera* Grt. Rochester, 21 July.
 local 1379 *Chorizagrotis thanatologia* Dyar. Morton, 18 July.
 local 1152 *Schinia trifascia* Hbn. Rochester, 4 Aug.; Sodus Point, 7 Aug.
 local 1180 *Schinia lynx* Gn. Rochester, 5 Aug.

Family NOLIDAE.

- local 842 *Celama cilioides* Grt. Lake Otsego (Charles Stearns).

Short notes wanted.

NOTES ON TEXAS COCCINELLIDAE.

By J. C. GAINES,

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The following is a list of Coccinellids collected principally by the writer in the vicinity of College Station and in Hidalgo county, Texas, during 1930, 1931, and 1932. Notes, as far as possible, are given on the habitat, host, and the date that each species was collected. Of the 64 species and varieties listed herein, 19 have not been heretofore reported from this state. The writer is indebted to Dr. E. A. Chapin for determining some of the species of *Hyperaspis* and *Scymnus*.

**Hyperaspis octonotata* Casey, Sonora, April 18, 1932 (Jones).

Hyperaspis lateralis Muls., College Station, May 2, 1932.

Hyperaspis bigeminata (Rand.), College Station, April 9, May 2, 1931, May 1, 1932, collected on arborvitae plants that were infested with *Dilachmus* sp. Dallas, May 23, 1932, feeding on cottony maple scale, *Pulvinaria vitis* (Linn.).

**Hyperaspis signata* (Oliv.), College Station, March to June, 1931. Austin, May 31, 1931, feeding on cottony maple scale, *Pulvinaria vitis* (Linn.).

**Hyperaspis binotata* (Say), College Station, March to June, 1931, feeding on aphids. Austin, May 31, 1931, feeding on cottony maple scale, *Pulvinaria vitis* (Linn.).

Hyperaspis globula Casey, Hidalgo county, January 23, 1933, feeding on scale, *Inglisia malvacearum* Ckll. (Clark).

Hyperaspis lengi Schfr., Hidalgo county, June 12, 1930, April 24, 1931, July 17, 1932, from week sweepings (Clark), January 25, 1933 (Monk).

**Hyperaspis nevadica* Casey, Elsa, July 17, 1932. The specimen from Texas differs from several specimens from Yakima, Washington, in having broader, reddish marginal vittae beginning very near the basal margin that are more dilated internally.

**Hyperaspis dissoluta* Cr., Taylor, April 4, 1929.

Hyperaspis trifurcata Schfr., College Station, January 28, 1918 (Reinhard).

* Species preceded by an asterisk have not been heretofore reported from Texas.

- Hyperaspis fimbriolata* Melsh., Taylor, June 1, 1929. College Station, June to August, 1931, July 7, collected on ragweed, *Ambrosia* sp., July 9, collected on cotton.
- Hyperaspis fimbriolata marginatus* Ga., College Station, May, 1932, from weed sweepings.
- **Hyperaspis bensonica* Casey, College Station, July 9, 1931, April 19, 1932, collected on cotton (Reinhard).
- Hyperaspis undulata* (Say), Hidalgo county, June 2, 1930. Elsa, July 17, 1932. (Specimens from Texas differ from specimens from Minnesota and Iowa in that they are more broadly oval, the pale marginal vittae are narrower, and the pronotum is more lustrous and densely punctate.)
- Hyperaspidius vittigera* Lec., College Station, July 31, October 2, 1931, May 9, 1932.
- **Hyperaspidius pallidus* Casey, College Station, July 15, 1932.
- Brachyacantha bistrispustulata* (Fab.), Hidalgo county, April 15, 1931 (Monk).
- Brachyacantha bistrispustulata decora* Casey, Mission, May 11, 1929 (Bibby). College Station, May 4, 1931, collected on mesquite, *Prosopis* sp., October 28, 1932, collected on cotton. Hidalgo county, May to July, 1930, December, 1930, collected on cacti that were infested with mealy bugs (Clark), June 1, 1931 (Monk).
- Brachyacantha bistrispustulata minor* Leng, Hidalgo county, June 24, 1930, April 15, 1931 (Monk). College Station, September 29, 1932.
- Brachyacantha dentipes* (Fab.), College Station, June 12, 1930.
- **Brachyacantha dentipes separata* Leng, Hidalgo county, May 27, June 6, 1930.
- Brachyacantha subfasciata* Muls., Sonora, April 14, 1932 (Jones).
- Brachyacantha quadrillum* Lec., Hidalgo county, May 27, 1930. College Station, June 15-18, July 31, 1931.
- Brachyacantha blaisdelli* Nun., Hidalgo county, June 6, 1930. College Station, June 28, 1932.
- Brachyacantha testudo* Casey, Hidalgo county, May 27, 1930, June 1, 1931 (Monk).
- Brachyacantha bolli* Cr., March 14-18, 1931, collected on black haw, *Viburnum* sp., infested with aphids, July 15, 1932, from oak, *Quercus virginiana* Miller, November 11, 1932, from cotton sweepings.
- Microweisea minuta* (Casey), College Station, April 18, 1930 (Reinhard).

- Scymnus creperus* Muls., College Station, common from April to November, 1931, 1932, on plants that were infested with aphids, was observed hibernating in moss, *Tillandsia usneoides* L., Taylor, June 1, 1927. Hidalgo county, June 1, 1931. *Scymnus texanus* Casey, College Station, May 4, 1931, June 6, 1931.
- **Scymnus haemorrhous* Lec., College Station, March 14, 1931, feeding on aphids.
- **Scymnus cervicalis* Muls., College Station, April 19, 1930, feeding on aphids, March 14, 1931.
- **Scymnus tenebrosus* Muls., College Station, April 12 and 15, 1931.
- Scymnus cinctus* Lec., College Station, March 20, 1930, collected on cotton, May 2, 1930, June and July, 1931, February 11, 1933, hibernating in grass. Taylor, June 20, 1929. Dickinson, September 7, 1931 (Roney). Plainview, October 14, 1931 (Jones).
- Scymnus americanus* Muls., College Station, May 23, June 9, and July 9, 1931.
- Scymnus intrusus* Horn, College Station, June, 1932, September 10, 1932 (Reinhard).
- Scymnus terminatus* Say, College Station, April, May, and June, 1931, Dickinson, September 10, 1931 (Roney).
- Scymnus brunnescens* Casey, College Station, June 14, 1932, collected on cotton.
- **Cryptolaemus montrouzieri* Muls., Beaumont, August 12 (Combs), introduced to control mealy bugs on figs.
- Rodolia cardinalis* (Muls.), Hidalgo county, May 20, 1930, December, 1930 (Clark). Beeville, August 11, 1931. Introduced to control cottony-cushion scale, *Icerya purchasi* Mask.
- **Psyllobora viginti-maculata* (Say), College Station, January 15, 1931, hibernating in moss, *Tillandsia usneoides* L., March to April, 1931.
- Psyllobora viginti-maculata renifer* Casey, College Station, March to August, 1931. Spur, September 12, 1932 (Bromley).
- Naemia seriata* (Melsh.), Galveston county, 1929 (Hull). Fort Bend county, May 29, 1932, collected on corn (Fletcher).
- Ceratomegilla fuscilabris* (Muls.), Taylor, June 20, 1929. College Station, 1931, 1932, common from April to November on plants that were infested with aphids. Hidalgo county, May

- 2, June 12, 1930. Dickinson, March 6, 1931 (Roney). Winterhaven, September 7, 1932 (Mortensen).
- Hippodamia convergens* Guer., Taylor, May 25, June 20, 1929. Gilmer, December 27, 1930. College Station, 1931, 1932, common from April to November on plants that were infested with aphids. Hidalgo county, May 21, June 12, 1930. Dickinson, March, 1931 (Roney). Winterhaven, September 7, 1932 (Mortensen).
- **Hippodamia convergens ambigua* Lec., College Station, May to October, 1931. Hidalgo county, June 1, 1931. San Angelo, May 15, 1931 (Jones). Lamesa, May 15, 1931 (Jones).
- **Neoharmonia venusta* (Melsh.), Simonton, June 9, 1928. Madison county, September 8, 1930 (Bibby). College Station, January 14, 1931, hibernating in moss, *Tillandsia usneoides* L., April to September, 1931, collected on willow, *Salix* sp., and prickly ash, *Xanthoxylum clava-herculis* Linn., that were infested with aphids.
- Coccinella novemnotata* Hbst., Amarillo, September 28, 1930 (Jones), May 10, 1931 (Jones). Hereford, May 12, 1931 (Jones). Gilmer, December 27, 1930.
- Cycloneda sanguinea* (Linn.), College Station, 1931, 1932, common from April to November on plants that were infested with aphids, was observed hibernating in moss, *Tillandsia usneoides* L., Hidalgo county, May 21, 1930. Winterhaven, September 7, 1932 (Mortensen).
- **Cycloneda sanguinea immaculata* (Fab.), College Station, 1931, 1932, common from April to November on plants that were infested with aphids. Hidalgo county, June 20, 1930.
- **Cycloneda munda* (Say), College Station, 1931, 1932, common from April to November on plants that were infested with aphids.
- Olla abdominalis* (Say), College Station, 1931, 1932, common from April to November on plants that were infested with aphids, was observed hibernating in moss, *Tillandsia usneoides* L., Winterhaven, September 7, 1932 (Mortensen).
- Olla abdominalis plagiata* Casey, College Station, 1931, 1932, common from April to November on plants that were infested with aphids, was observed hibernating in moss, *Tillandsia usneoides* L.
- **Olla abdominalis arizonae* Casey, Castolon, June 1, 1928 (Bibby). Hidalgo county, May 21, 1930. College Station, March 23, April 7, 1931. Spur, September 11, 1932 (Bromley).

- Cleis concolor* Cr., College Station, March 19 to April 27, 1931, collected on arborvitae plants that were infested with *Dilachnus* sp.
- Neomysia pullata* (Say), College Station, March to April, 1931, collected on arborvitae plants that were infested with *Dilachnus* sp.
- Axion pilatei* Muls., Taylor, May 10, 1929. Spur, March 11, 1931. College Station, May 26, 1931, collected on oak, *Quercus stellata* Wangenheim, that was infested with scale. Dallas, June 2, 1932, feeding on cottony maple scale, *Pulvinaria vitis* (Linn.).
- Axion tripustulatum* (DeG.), College Station, April 15, May 26, June 1, 1931, collected on oak, *Quercus stellata* Wangenheim, that was infested with scale. October 7, 1932, collected from moss, *Tillandsia usneoides* L.
- Chilocorus cacti* Linn., Hidalgo county, April 15 to June 15, 1930, feeding on scale on citrus trees. Kenedy, June 30, 1931, feeding on scale on chinaberry. Dickinson, September 7, 1931 (Roney).
- Chilocorus bivulnerus* Muls., Hidalgo county, June, 1930, feeding on scale on citrus trees. College Station, May, 1931, collected on oak, *Quercus stellata* Wangenheim, that was infested with scale.
- Exochomus marginipennis childreni* Muls., Taylor, June 20, 1929. College Station, April 4, 1930. January 15, 1931, hibernating in moss, *Tillandsia usneoides* L., April 20, 1931, May 18, 1931, collected on oak, *Quercus stellata* Wangenheim, that was infested with aphids, May 9, 1931, collected on mesquite, *Prosopis* sp., November 11, 1932, collected on cotton, observed in large numbers on ragweed, *Ambrosia* sp., probably feeding on pollen.
- Exochomus marginipennis latiusculus* Casey, College Station, April 1, 1917 (Reinhard). Hidalgo county, December, 1930, feeding on mealy bugs on cactus (Clark).
- **Epilachna borealis* (Fab.), College Station, April 17, 1932 (Reinhard).
- Epilachna corrupta* Muls., Observed near El Paso in 1931, no specimens taken (Thomas).
- Epilachna toweri* Joh., Presidio, August 17, 1931 (Thomas).

OBSERVATIONS ON *DORU ACULEATUM* SCUDDER
(DERMAPTERA).

BY KENNETH W. COOPER, Flushing, L. I.

Doru aculeatum (Scudder) is found rather commonly under cover on the wooded slopes adjoining the Bayside, L. I., salt marsh. To my knowledge this insect has never been captured within the swamp limits, and it seems that its particular habitat is moist, wooded regions. During the summer months *Doru* is rather difficult to find in numbers, but in the late fall it is very abundant under cover. It burrows in the soft débris beneath stones and logs at the approach of the hibernation period. Often one may take as many as fourteen or fifteen specimens from under a single log, where they are found clustered together. One afternoon during the past November, Mr. George Lipsey and the author were fortunate enough to capture sixty-three specimens within as many minutes. Of these, thirty-two specimens were females. It appears, then, that the sexes are represented by very nearly equal numbers.

Of the thirty-two females, three showed malformations of the anal forceps. Among the male specimens there was but a single member not having typical forceps. Whether or not these aberrant members are the result of disturbances which affected the development in the embryonic stage, I cannot say. As the last abdominal segments of these specimens show little evidence of mutilation, I would hesitate before suggesting that these deformed forceps are the result of regeneration of parts destroyed by combat or other means of violence, although the Nakaharas (Bull. B'klyn Ent. Soc., Vol. xxiv, p. 161, 1929) show that such regeneration may occur. The accompanying plate figures the extent and character of these malformations.

EXPLANATION OF PLATE XVI.

Figures 1, 2, & 3. Deformed forceps of female specimens.

Figure 4. Normal female forceps.

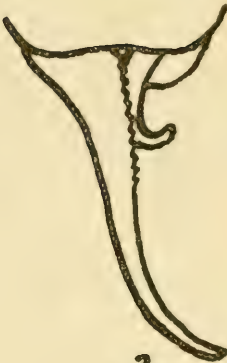
Figure 5. Deformed male forceps.

Figure 6. Normal male forceps.

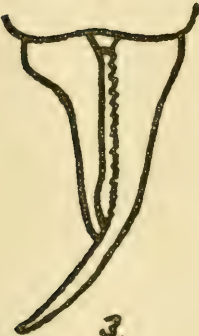
All figures to the same scale (10x), and of dorsal aspect.



1.



2.



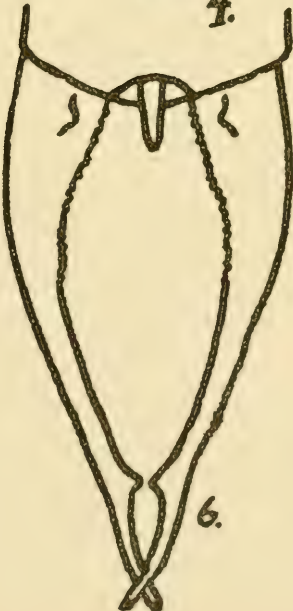
3.



4.



5.



6.

A NEW GORYTES FROM PARAGUAY (HYMENOPTERA: SPHECIDAE).

BY RICHARD DOW, Cambridge, Mass.

Gorytes similicolor, n. sp.

Female. Black, locally tinged with fuscous. Two obscure spots on the clypeus below the insertions of the antennae, a narrow continuous fascia on the pronotum, a short obscure fascia on the anterior half of the metanotum, the posterior margin of the first tergite, marginal fasciae on tergites 2-5, the one on tergite 4 slightly bi-emarginate anteriorly, the fascia on tergite 5 more clearly so, narrow marginal fasciae on sternites 2-5, sixth sternite: *yellow*. Wings yellowish, somewhat iridescent; the nervures yellowish-brown. Hair silvery, more or less tinged with yellow.

Head closely punctate and hairy, with short hair on the vertex. Clypeus medially truncate, with a few larger punctures near the relatively glabrous anterior border. Margin of the labrum with coarse, bronzy hair. Inner margins of the eyes sinuate, roughly parallel. Distance between the posterior ocelli more than twice the distance from one of them to the anterior ocellus, and about two-thirds the distance to the eye.

Thorax closely punctate and hairy, with shorter hair on the dorsum. Pronotum with a series of short longitudinal ridges on each side of the collar. Mesonotum with a stubble of yellowish hair. Scutellum slightly impressed posteriorly, with a small elliptical depression filled with a tuft of hair; the anterior suture finely foveolate. Metanotum convex, with a plane anterior face. Propodeal enclosure medially impunctate, with a longitudinal linear furrow which is wider at the base; the enclosure separated from the remainder of the propodeum by a coarsely foveolate suture which is much broader at the sides. Posterior face of the propodeum roughly sculptured, elsewhere simply punctate. Lateral sutures of the thorax as in *Gorytes mystaceus*, but less conspicuously foveolate. Mesosternum with a fine median carina. Wings, excepting the coloration, as in *mystaceus*. Legs densely and finely punctate, with silvery pubescence; otherwise without distinctive characters.

Abdomen densely and finely punctate, pubescent. Anterior slope of the first tergite with a longitudinal, tongue-shaped depression; the basal portion with scattered punctures, and two lateral carinae slightly converging behind; the posterior part more shallow, sloping gradually into the remainder of

the tergite. Pygidial area with straight converging lateral margins, rounded at the apex, and covered with coarse, bronzy hair. Fourth and fifth sternites each with two oval iridescent areas of extremely fine longitudinal striations; the posterior part of these sternites with large scattered punctures. Sixth sternite with large punctures and a median impunctate stripe.

Length: about 12 mm.

Holotype: a female collected at Villarrica, Paraguay, in February, 1923, now in the Museum of Comparative Zoology, Cambridge, type no. 17051.

In Handlirsch's key to the American species of *Gorytes*, this specimen runs to *areatus* Taschenberg, to which it is closely related. No specimens of *areatus* are available for comparison, but according to the descriptions, *similicolor* may be easily distinguished by its larger size, the color of the wings, and the distribution of the maculations. Although Taschenberg states that *areatus* has abdominal fasciae on tergites 1-3, Handlirsch says that there are four interrupted fasciae without mentioning on which tergites they occur. According to Handlirsch, the carinae which limit the depressed area of the first tergite are parallel, instead of convergent posteriorly.

The author is indebted to Dr. Joseph Bequaert for the privilege of describing this specimen. The name *similicolor* was selected on account of the striking resemblance of this species to certain vespid wasps, such as *Pachodynerus nasidens* (Latreille) and *Nectarina lecheguana* (Latreille).

A Thought on Mounting.—When examining collections, one is frequently struck by the facts that some entomologists seem not yet weaned from the primitive idea of mounting insects suitably for arrangement in artistic geometric designs under glass in a gilt frame for hanging on the wall. For scientific purposes, the art idea should go by the board. Insects should be mounted in such a manner as to exhibit clearly for study all the external, critical characters of the species or genus.—J. R. T.-B.

ADDITIONS TO THE NEW YORK STATE LIST OF INSECTS.

JOHN N. BELKIN, Harvard University.

This list is the result of a few weeks' collecting at Roslyn, Long Island, during the summer of 1930. In looking over Mr. Kenneth W. Cooper's recent list of additions to the coleopterological fauna of Long Island (Bull. Brook. Ent. Soc. XXVII, pp. 189-195), I find that many of my captures confirm Mr. Cooper's records, especially in the smaller families, as in Mordellidae (*Tomaxia lineola* Lec., *Mordellistena nigricans* Melsh., *M. pustulata* Melsh., *M. convicta* Lec., *M. morula* Lec.). But there still remain a few species that have not previously been recorded from Long Island in the New York State List of Insects or in Mr. Cooper's Additions. Some of these are quite common throughout the state and it is strange that they have not been found on the island before; while others are quite rare in the state; and a very small number—five—were not previously taken in New York.

All the species in this list were determined by myself. A number were verified by Mr. Andrew J. Mutchler of the American Museum of Natural History.

In writing up the list, the general plan of Mr. Cooper's list was followed. The numbers preceding the generic name are those of the Leng Catalogue. An asterisk (*) indicates that the species was not recorded from New York State in the New York State List of Insects.

SCAPHIDIIDAE

6528—*Toxidium grammaroides*, Lec.

HISTERIDAE

6571— <i>Hister interruptus</i> , Beauv.	*6664— <i>Phelister sayi</i> , Carn.
6627— <i>H. americanus</i> , Payk.	6724— <i>Isolomalus bistriatus</i> , Er.

LYCIDAE

6943—*Eros crenatus*, Germ.

LAMPYRIDAE

6979—*Lucidota nigricans*, Say

CANTHARIDAE

7161—*Silis bidentatus*, Say

MELYRIDAE

*7296—*Attalus varians*, Horn

MORDELLIDAE

7857—*Mordellistena militaris*, Lec. 7943—*Anaspis rufa*, Say

RHIPHOPHORIDAE

7970—*Rhipiphorus stylopides*, Newn.

BUPRESTIDAE

9408—*Chrysobothris lecontei*, Lg.

NITIDULIDAE

* 10099—*Stelidota octomaculata*, Say

CUCUJIDAE

10242—*Laemophlaeus modestus*, Say

EROTYLIDAE

10292—*Acropteroxys gracilis*, Newn. 10334—*Triplax thoracica*, Say

MYCETOPHAGIDAE

10493—*Mycetophagus pictus*, Csy.

COCCINELLIDAE

11202a—*Anatis quindecimpunctata mali*, Say

TENEBRIONIDAE

12308—*Hoplocephala viridipennis*, Fab. 12323—*Platydemus americanus*, Cast. & Brll.

MELANDRYIDAE

12521—*Abstrulia tessalata*, Melsh. 12534—*Eustrophinus confinis*, Lec.

CISIDAE

12997—*Xestocis levetti*, Csy. 13037—*Octotemnus laevis*, Csy.

SCARABAEIDAE

13159—*Aphodius rubeolus*, Beauv. 13506—*Phyllophaga inversa*, Horn
 13162—*A. stercorosus*, Melsh. 13519—*P. barda*, Horn
 13198—*A. rubripennis*, Horn 14010—*Osmoderma scabra*, Beauv.
 *13263—*Ochodaenus musculus*, Say

CERAMBYCIDAE

- | | |
|---|---|
| 14214— <i>Hypermalus medialis</i> ,
Csy. | 14679— <i>Xylotrechus colonus</i> ,
Fab. |
| 14673— <i>Glycobius speciosus</i> ,
Say | 14912— <i>Cacoplia pullata</i> , Hald.
15026— <i>Acanthocinus pusillus</i> ,
Kby. |

CHRYSOMELIDAE

- | | |
|--|---|
| 15240— <i>Lema palustris</i> ,
Blatch. | *15879— <i>Oedionychis ulkei</i> ,
Horn |
| 13506— <i>Phyllophaga inversa</i> ,
Mann. | 16016— <i>Chaetocnema confinis</i> ,
Cr. |
| *15539— <i>Triachus vacuus</i> , Lec. | 16047— <i>Longitarsus testaceus</i> ,
Melsh. |
| 15545— <i>Nodonota tristis</i> , Oliv. | 16126— <i>Uroplata porcata</i> ,
Melsh. |
| 15636— <i>Prasocuris vittata</i> ,
Oliv. | |

BELIDAE

- 16275—*Eusphyrus walshii*, Lec.

CURCULIONIDAE

- | | |
|--|---|
| 16369— <i>Attelabus rhois</i> , Boh. | 17719— <i>C. quercus</i> , Say |
| 17415— <i>Lixus musculus</i> , Say | 17721— <i>C. longulus</i> , Lec. |
| 17712— <i>Cylindrocoptus binotatus</i> ,
Lec. | 17928— <i>Tyloderma aerea</i> , Say
17929— <i>T. punctata</i> , Csy. |

SCOLYTIDAE

- 18512—*Xyleborus celsus*, Eich.

Notice to Subscribers.—Please use promptly the enclosed subscription blank. This will save our Treasurer labor and expense of postage in sending out bills.

SOME NEW GENERA AND SPECIES OF WESTERN LEAFHOPPERS.

By E. D. BALL, University of Arizona, Tucson.

Parabolocratus atascaderus Ball n. sp.

Resembling *viridis* but slightly larger with a longer vertex in both sexes. Green with the male elytra tipped with smoky and the legs and a wedge on venter black. Length ♀ 8 mm.; ♂ 6 mm.

Vertex, slightly longer than in *viridis* in the female, definitely longer with the margins almost straight for some distance from the eye in the male, disc flat or concave, the apex slightly elevated, face but little inflated in the female with a much broader foliaceous margin anteriorly, than in *viridis*. Male face not inflated, profile straight. Elytra reaching the middle of last abdominal segment in the female with the apical cells very long. Male pygofer much longer than the triangular plates. In drying the plates are usually elevated so as to expose heavier and more strongly curved styles than those found in *viridis*.

Color. Female green the tip of the ovipositor scarlet, male green, a faint black line under the vertex margin and usually a still fainter one above, the apical cells smoky the legs and a wedge on venter black.

Holotype ♀ allotype ♂ and 14 paratypes taken by the writer north of Santa Margarita, California, June 23, 1931. The elongated foliaceous head in the male will at once distinguish this species from *viridis*. The narrower vertex, black legs and venter will separate it from *planus*.

Parabolocratus attenuatus var. *purpureus* Ball, n. var.

Similar in form and structure to the species, slightly narrower with a longer ovipositor in the female. Color a rich but slightly pale purple with a smoky cast in the males, the vertex paler, a white line on either side from the apex of vertex to the middle of costa omitting the eyes; below with a scarlet tinge in the females, smoky in the males.

Holotype ♂ March 22, 1931, allotype ♀ April 25, 1931, and 12 paratypes taken in March and April, 1931 and 1932, all taken in Sabino Canyon, Tucson, Arizona, by the author. This is a striking form in this group and is much more abundant than the broader green form described as *attenuatus*.

Kinonia Ball, n. gen.

Superficially resembling a small and extremely elongate *Athysanella*, but with the head produced into an extremely long almost *Cephalelus*-like cone and the elytra covering all but the last two segments of the abdomen. Pale straw color without pattern, the eyes dark.

Vertex nearly flat posteriorly where it has a median groove, joining the front before the eyes in forming a slightly flattened cone, without margins or groove. Eyes extremely large and long bordering more than half the pronotum and forming one-half the length of the cone-like head, which is from two to three times as long as wide. Ocelli extremely small, close to and in front of the eyes, connected to the antennal pits by a suture. Clypeus long, large, together with front forming a long wedge. Antennae long with little indications of a pit. Pronotum short, mostly enclosed by the eyes slightly emarginate in the middle posteriorly, running around beneath the body laterally as in *Neocoelidia* but lacking the lateral carinae behind the eyes. Elytra long and very narrow inclined to separate posteriorly exposing one or two segments of the long abdomen. Venation obscure, simple, resembling *Euscelis*. Abdomen elongate with extreme elongation of the pygofers and ovipositor as in some species of *Athysanella*.

Type of the genus *Kinonia elongata* n. sp. This appears to be an Aucephaline genus with no close affinities in our fauna. The nymphs have even longer heads than the adults.

Kinonia elongata Ball, n. sp.

Somewhat resembling *Athysanella acuticauda* but much smaller and slenderer, as pale and inconspicuous as a *Lonatura*, small, elongate, straw-colored with extremely long head and ovipositor. Length ♀ 4 mm., ♂ 2.8 mm., width .8 mm. Structure of the genus; the vertex $2\frac{1}{2}$ times longer than width between the eyes, more than twice the length of pronotum, apex of head an elongated cone slightly flattened on top, face strongly transversely arched without lateral rugae or markings, clypeus slightly exceeding genae. Elytra shorter than abdomen, roundly narrowing to the divergent apices, subhyaline with venation obscure, simple, resembling *Euscelis* with the outer anteapical irregular or wanting the apical cells short. Female segment broad, slightly shorter than preceding the posterior margin slightly emarginate, pygofers extremely elongate four or five times the length of the segment and exceeded by one-third the length of the ovipositor. Male genitalia resembling that found in

Athysanella, the pygofer laterally compressed and curving downwards at apex thus depressing the blunt spoon-shaped plates, valve obtusely rounding one-half the length of the plates.

Holotype ♀ and allotype ♂ taken August 10, together with eight paratypes taken July 14 and August 10, in the author's collection. Eight paratypes in the collection of the Kansas University, taken July 14, all taken in Sabino Canyon of the Santa Catalina Mountains, Tucson, in 1932, by R. H. Beamer and the author. This striking species was found exclusively on the "pagoda" grass *Muhlenbergia dumosa* growing on the steep walls of the canyon. On July 14 nymphs were in abundance with a few fresh adults, by August 10 they were mostly adult.

Ionia Ball, n. gen.

Allied to *Nionia* and *Xestocephalus* in the conical head with the ocelli far from the eyes and the strong deltocephaloid venation. Short stout, superficially resembling a minute long-winged testaceous *Driotura* but structurally quite distinct.

Head short obtusely conical about half the length of the pronotum the vertex and face rounding over in a uniform curve. As seen from above but little longer in the middle than against the eyes with the large ocelli on the (obsolete) margin nearly two-thirds of the distance from the eye to the apex. Front longer than wide, slightly constricted between the antennae, broadly roundly narrowing to the long almost parallel margined clypeus, the parabolic apex of which much exceeds the genae. Genae very narrow almost straight from the middle of the eye to the clypeus. Lorae extremely long and narrow. Pronotum about twice wider than long the lateral margin eliminated the oblique margins joining the angle of the eye. Scutellum unique in possessing a broad, obtusely rounding plate-like structure that projects from under the pronotum, and laterally exposes the normal margin which terminates on each side in a slight white tipped tooth suggestive of the structure found in the *Centrotinae*. Elytra very broad and short, globose, enclosing the abdomen, coriaceous with the venation obscure. The costal margin sharply deflexed with a carinae at the angle on the basal half.

Type of the genus *Ionia triunata* n. sp.

In *Nionia* the head is scarcely more than a narrow band around an exceedingly large pronotum, the ocelli are nearer the eye than the apex and there are rows of setigerous punctures paralleling

the nervures. In *Xestocephalus* the front is exceedingly broad the lorae semicircular, the genae broad and angled and the elytra are long, subhyaline without a deflexed costal portion.

***Ionia triunata* Ball, n. sp.**

Structure of the genus. Short stout cinnamon brown, with a smoky apical margin to the elytra. Length ♀ 2.4 mm., ♂ 2 mm., width 1.2 mm.

Slightly resembling *Xestocephalus brunneus* but smaller and stouter with short coriaceous, gibbous elytra and shorter head and a narrow face. Vertex one-third as long as its basal width, face slightly and regularly convex in profile, front slightly transversely convex, width across antennae less than its length instead of the reverse as in *Xestocephalus*. Genae twice longer than wide instead of nearly semicircular, clypeus narrowing towards apex instead of constricted near base. Pronotum deeply rugulose; one-half its length included in the curve of the vertex. Eyes relatively small but exceeding the pronotum in width instead of very small and narrower than the pronotum as in *Xestocephalus*. Elytra very broad and short the costal margin strongly curved as in *Clasoptera*. Venation simple regular, one cross-nervure, the anteapical cells long, quadrangular, the apical cells almost square. Female segment broad and short usually arched so as to appear emarginate and slightly notched, pygofer stout. Male plates broad almost quadrangular, not quite equaling the pygofer. Valve very short and broad.

Holotype ♀ August 10, allotype ♂ July 14, 6 paratypes of the same dates in the author's collection and 8 paratypes in the Snow collection, Kansas University, all taken in Sabino Canyon, Tucson, Arizona in 1932 by Dr. R. H. Beamer and the writer, from a small red mat *Euphorbia*. Two females from the Baboquivari Mountains, Sept. 29, 1931 (Ball) are probably this species but have the head dark brown to black.

***Stirellus beameri* Ball n. sp.**

Form and structure of *obtus* nearly, larger creamy with 5 brown bands on vertex and pronotum and 5 brown stripes on each elytron. Length ♀ 3.7 mm., ♂ 3.2 mm.

Vertex similar to *obtus* slightly acutely conically pointed slightly longer than its basal width, eyes extremely long enclosing more than half the pronotum. Elytra as in *bicolor* just covering abdomen, but not the ovipositor, female segment short transverse almost parallel margined as in *obtus* the

ovipositor exerted one-fourth its length the tip red. Male plates together bluntly spoon-shaped over the compressed pygofer one-third longer than the valve with a submarginal row of stiff spines.

Color. Vertex white a black spot at apex, a band in front of eyes and a broader one before the base. Pronotum creamy an anterior and a posterior brown band the former with a narrower black one superimposed. Elytra brown with a broad stripe inside the costa, a broader one inside the claval suture and the nervures white. The apical region cinnamon bounded by two narrow black lines. Face pale washed with tawny, about 6 brown arcs on each side the front, two of them united and emphasized below the apical spot. A pair of large black spots behind the antennae. Four black spots on the apical tergum hidden by the elytra.

Holotype ♂ and 8 paratypes in the collection of the author. Allotype ♀ and 8 paratypes in the Snow Entomological Collection, Kansas University, all taken by R. H. Beamer and the writer on the east slopes of the Santa Rita Mountains, July 11 and 12, 1932. This striking species superficially resembles *Commellus comma* in color and pattern. Named in honor of Dr. R. H. Beamer whose abilities as a collector are only exceeded by the excellence of his interpretation of the genus *Erythroneura*.

Exitianus armus Ball n. sp.

Resembling *obscurinervis* but shorter and broader with a broad uniformly rounding vertex and a pair of large round black spots on the margins of the pronotum. Length ♀ 4.5 mm., ♂ 3.7 mm.

Vertex uniformly rounding the anterior and posterior margins parallel instead of it being obtusely conically pointed as in *obscurinervis*, broadly rounding to front which is definitely narrower than in *obscurinervis*. Clypeus expanding towards apex rather than narrowing as in that species. Pronotum broader and shorter with the posterior margin concavely excavated. Elytra slightly shorter with the venation similar. Female segment similar, the ovipositor but slightly longer than the pygofer. Male plates much broader at base, together triangularly narrowing almost to a point and then extended as long almost thread-like upturned apices instead of narrow at the base and uniformly sloping to the apex.

Color. Vertex creamy a pair of large round black spots against the ocelli and a minute pair within and behind them. Pronotum milky with four brown stripes on the disc and a pair of black spots on the lateral margins. Scutellum creamy with three pale brown stripes. Elytra milky subhyaline, the

nervures narrowly black. Face and below pale a pair of spots or crescents on upper part of front, a dot above and one below antenna brown. Dark examples may have a pair of spots in each basal angle of vertex and brown arcs on front.

Holotype ♀ and allotype ♂ Tucson, Arizona, April 20, 1930, ten paratypes, Superior, July 31, 1930, and Tucson from April 12 to September 22, 1930, all collected by the writer. A distinct little species limited to a single food plant, the Desert Hackberry.

NEW RECORDS OF HETEROPTERA FROM ARKANSAS.

BY J. R. DE LA TORRE-BUENO, White Plains, N. Y.

Recently I received from Miss Louise Knobel, of Hope, Ark., the following species taken there by her on the dates and under the conditions mentioned. It should be noted that none of the species appears to have been taken in the State; at least, neither Blatchley in his Heteroptera of the Eastern United States, nor Van Duzee in his Catalogue lists them from Arkansas. The species are arranged in the order of Hemiptera of Connecticut.

Corythucha cydoniae Fitch.—September 22, 1931; 7 specimens beaten from oak (*Quercus* sp.). This is an inhabitant of *Crataegus*, so far as heretofore known. Blatchley states it is not recorded south of Maryland; and VanDuzee gives it only from New York.

Cnemodus mavortius Say.—Taken at light, September 9, 1931; seems a wide-spread species, but no specific Arkansas records. *Corizus hyalinus* Fabr.—From *Aster*, October 10, 1931; a cosmopolitan species, with no Arkansas records found.

Brochymena quadripustulata Fabr.—September 10 and 19, 1931; June 1, 1932, a number at light; December 1, 1931, a couple on a wall. This species is ordinarily found on bark. There are no specific Arkansas records, although it is common and widespread.

Banasa dimidiata Say.—At light on June 20 and 26, 1932. It does not seem to be known from the State.

Homoemus parvulus Germar.—Taken by sweeping flowers, May 5, 1932. This seems to be the first record from the State.

RANDOM NOTES OF AN ARIZONA FIELD COLLECTOR.

ON SOME POLYCESTINI (COLEOPTERA-BUPRESTIDAE), WITH
DESCRIPTION OF A N. SP. OF ACMAEODERA.

By D. K. DUNCAN, Globe, Arizona.

Chrysophana placida Lec.

It is interesting to note that the coloration of this more or less common western borer varies greatly with locality. This insect can be taken in large numbers in the heavily forested areas of Arizona, especially around the lumber camps as at McNary, in the White Mt. district, on freshly-cut logs of *Pinus ponderosa* (western yellow pine), but is invariably a solid bright green color. I have never taken specimens in Arizona that show the various shades of rainbow tints of those from the Pacific Northwest districts.

I have also taken this insect in the Sierra Ancha Mts. of Central Arizona where it was bred from peeled logs of *Pinus ponderosa*, used in a log cabin, evidently peeling the logs is no assurance to keeping the boring pests out?

Polycesta arizonica Schffr.

A few of these insects were bred from large (*Quercus* sp?), white oak trees in the Chiricahua Mts. of Southeastern Arizona. Many larvae were noted, dead insects which had apparently hibernated, and altogether much damage done to the larger oak trees in this area during the spring of 1932. Mature specimens of this insect were also taken on *Prosopis velutinus* (mesquite), in the Baboquivari Mts., Pima County, Arizona, in August, 1932.

Acmaeodera cuprina Spin.

Dr. Horn in his "Revision of the Species of the Acmaeodera of the U. S." in Trans. Amer. Soc., VII, Jan., 1878, expressed doubt as to the validity of locality of this insect, and H. C. Fall in "On American Species of Acmaeodera" in Journal of the N. Y. Ento. Soc. (Vol. VII, March, 1899), calls attention to the fact that no examples of this insect were reported from North America, north of Mexico, and stated that it was doubtful if this insect should be retained in a list of our fauna. I wish to state that *cuprina* is found well within the borders of Arizona. I have in my cases a series of four labelled "Santa Catalina Mts., Pima

County, Arizona, Aug., 1930" and collected by students of the University of Arizona at Tucson. Also I personally collected some dozen specimens on August 14th, 1932, in the Santa Rita Mts., Pima County, Arizona, they were not common, but single specimens were taken here and there between Madero or White House Canyon and the summit, over a wide range of country. All were feeding on a small flower belonging to the daisy group and were all taken over the 5000 feet elevation mark. The Santa Rita Mts. are about forty miles north of the Mexican border.

Acmaeodera flavomarginata Gray.

Southern Arizona should be added to list of localities on this insect, several being taken by myself on Aug. 18th, 1932, on west side of the Baboquivari Mts., Pima County, Arizona, at an elevation of between 3500 and 4000 feet.

Acmaeodera delumbis Horn.

This insect was placed as a synonym of *Acmaeodera gibbula* by H. C. Fall in his "On American Species of *Acmaeodera*" in Journal of N. Y. Ent. Soc. (Vol. VII, March, 1899.)

After a careful study of many specimens of both *gibbula* and *delumbis* I must reach the conclusion that *delumbis* is at least a valid variety if not a good species. *Delumbis* occurs in the early part of June and *gibbula* does not appear before middle July and is not at the peak of emergence until around the first of September, by the time *gibbula* appears the type *delumbis* is practically gone. My examination of thousands of specimens of *gibbula* show no connecting links in the matter of markings, always having the series of three red spots down the sides of each elytron, while *delumbis* is always devoid of any such spots, no *gibbulas* have been noted with less than the three red spots which should be the case if the two were variants of each other. *Delumbis* is not nearly as common as *gibbula* and does not necessarily appear in the same place where *gibbula* later appears nor do *delumbis* apparently ever associate with the *gibbula* types in the few places where both types have been observed at the same time. It is my personal opinion that *delumbis* is a valid species although so close structurally that it would be practically impossible to separate from *gibbula* on any character except the absence of the red spots on the elytra. Only tests of breeding will prove this point. In the meantime I would suggest that *delumbis* be restored as a varietal form of *gibbula* and given the Leng's Catalog number of 9219a.

Acmaeodera angelica Fall.

Central Arizona should be added to localities on this insect, many specimens being taken by myself over a period of years in the foothills of the Pinal Mts., Gila County, Arizona.

Acmaeodera lineipicta Fall.

Since Mr. Fall described this new species from two examples, twenty-nine more specimens have been taken by me, twenty-six of them in the hills above San Carlos Lake, Gila Co., Arizona, which was the type locality, one some twelve miles northeast of Globe, and two at Oracle, Arizona, which is on the northern slope of Mt. Lemon, in the Santa Catalina Mts. All of these specimens run absolutely true to type with no variations except size. This would tend to dispel any doubt that this is not a valid species, also that it is distributed through Central Arizona being however more or less rare, taken around 4500 feet elevations and very early in the spring, April and May.

Acmaeodera papagonis n. sp.

Closely related to the *pulchella-lucia-obtusa* group, nearer to *lucia*, which species it should follow in the list and from which it is difficult to separate structurally. Lateral thoracic spot has been present in examples examined. It can be separated from *lucia* at once by the elytral markings which are very distinct. The ground color is bluish black and very heavy, while the light markings are much more delicately drawn than in *lucia* and consist of four bands across the elytra and placed as follows: top pair starting at scutellum and running thence to sides of elytra at an approximate 30 degree angle, a pair of medial bands running across elytra almost horizontally and two more pairs of bands spaced each about one-third way between medial bands and apex of elytra, these two pairs of bands running about the same angle as the top bands, tip of elytra with two tiny spots and several other indistinct spots scattered about near tips of elytra, these markings are more smooth and uniform in appearance from *lucia* and the bluish black ground color is quite different.

Type: Length 10.3 mm., width 3.7 mm., in my collection.

Paratype: Length 7.2 mm., width 2.6 mm., in my collection

Paratype: Length 9.1 mm., width 3.2 mm., in collection of Mr. H. C. Fall, who has kindly examined the specimens.

Paratyndaris olneyae Skinner.

This species observed emerging from *Prosopis velutinus* (mesquite) at San Carlos Lake, Gila Co., Arizona, and also at Santa Rita Mts., Pima Co., Arizona.

Paratyndaris barberi Skinner.

Reported as hatched from a species of wood known as "iron-wood" by students of the University of Arizona at Tucson, Ariz.

NOTES ON ACTIAS LUNA AND ITS VARIATIONS.

BY CHARLES RUMMEL, Newark, N. J.

For several years an attempt was made to raise another brood of lunas from the Summer brood, which in reality is only a partial second brood. Out of the cocoons obtained from the adults hatched in June none would hatch in some years and varying amounts from one to fifty per cent would hatch in other years. It was observed that the larvae obtained from this summer form were different and much handsomer than the earlier ones, the larvae of the early summer brood being a uniform green, while the late Summer or second brood of larvae would be ornamented with crimson red tubercles all over. Those larvae were fed up to the last stage for several years but no cocoons were obtained. As the weather became cool at the beginning of October, the larvae usually died without spinning their cocoons. In 1931 a female with the pink edge on the outer margin hatched. This was tied out and it became mated with a green form. Those larvae were reared, all of which were adorned with those red tubercles. A few of the cocoons were kept for observation and breeding. In 1932 another female with the pink edge was tied out. In this case a male that also had the pink edge became mated with it. All the larvae from these parents had those crimson red tubercles. About 150 cocoons were obtained from this brood of larvae. The final aim of this experiment is to completely isolate this pink edge variety which Mr. Davis called *rubromarginata*, so it can be bred independent of its typical form *luna*.

TROTTING THE BOGS WITH THE WISE BULLFROGS.

By C. A. FROST, Framingham, Mass.

One of the most prolific methods of collecting Coleoptera may be called "Bog Trotting," and I have practiced it for many years with so much success that I would like to recommend it to all beetle collectors who are not fanatically dry or constitutionally averse to intimate association with soft clinging mud and turbid swamp water.

The method is merely treading about in the mud and water of cat-tail swamps, along the edges of stagnant pools, ponds, meadow streams and rivers. Of course one must carefully watch his step in exploring a quaking-bog or he will find himself, as I once did, waist deep in odorous, bubbly ooze; it would be a good idea to wear "bog-shoes" in these super-sensitive areas. They used to put these large wooden shoes on the old horse when hauling out the "medder" hay from the softer ground.

Mr. R. J. Darlington has elaborated on my method and we have had remarkable success even in water from six to twelve inches deep, provided there is grass and aquatic vegetation present. It is better to do the treading facing the sun and working backward since many of the large Carabidae are very quick at disappearing after they are disturbed. This crawfish locomotion may put the collector into absurd positions especially when his heels hit a tussock or hidden root; since it is generally necessary to sit down in an emergency like this, once must not mind six inches of muddy water and be thankful that he is not exploring a bog flooded by cold springs. It is not quite so comfortable to miss abutting on the tussock in April though it is much more exhilarating—from the waist down.

By this method of collecting one routs out many species that are rarely taken by the more formal modes; in favorable places *Blethisa quadricollis*, *multipunctata* and *juli*; *Elaphrus cicatricosus*, *clairvillei* and *olivaceus*; the *Bembidiini*, *Platynini*, *Pterostichini*, *Chlaenini*, *Licini*, *Stenini* and other *Staphylinidae*, and also the *Hydrophilidae* may be taken in numbers. Specimens appear to view climbing up the grass stems, swimming on the water, crawling over the trampled vegetation and even seeking refuge on one's person. This is the only successful way to collect many of the *Carabidae* and other swamp-loving species. Some-

times one finds interesting *Chrysomelidae* and *Coccinellidae*; I have taken more specimens of the rather rare *Coccidula lepida* by this method than by any other.

The coleopterous population of partly dried out swamp in September is surprising, even if the swamp is densely wooded. June seems to be the best time for numbers of individuals and species but something can generally be found from early April to late October, and one is always sure of wet feet. There are two conventional styles of footwear in use at present: Mr. Darlington prefers sneakers while I am inclined to the opinion that heavy shoes are more dressy and also protect the ankles from stubs and saw grass. It may be slightly more comfortable to have a hole in the toe of each shoe—it is not necessary to empty the mud and water out of them so often.

I hope this article will develop an expert operator of bog-shoes or a collector with feet tough enough to ignore shoes.

This method is not yet patented and all enthusiasts are cordially invited to try their luck.

NOTES ON THE ISOLATION OF FORMS OR RACES OF LEPIDOPTERA.

BY CHARLES RUMMEL, Newark, N. J.

There has been much speculation amongst well informed and active entomologists as to whether certain species of Lepidoptera are single, double or even treble brooded. Up to date nothing has been written on the subject of whether a single and double brooded race of the same species could exist in the same locality, which in a lengthy experiment extending over a period of six years has proved to be the case. *Smerinthus geminatus* Say is the species in question. *S. geminatus* can be taken on the wing by the end of May and its larvae can be collected during June and again during August, which no doubt would indicate that this species is double brooded. In the year 1927 some larvae of this species were collected in Green Village, N. J., feeding on aspen and fed up to pupation. The pupae were kept for observation and breeding. The adults emerged in July, 1928. The same stock has been bred every year since as a single brooded race.

TO AUTHORS.

A STATEMENT OF POLICY.

"The time has come, the walrus said, to talk of many things—
Of ships, of sealing wax, of cabbages and kings."—Carrol.

Our contributors have doubtless noticed that not only is our BULLETIN smaller, but also that their papers have been delayed in appearance. This is due to the universal cause, which compels us to be careful. We have MSS. on hand at present for at least two more numbers after this one; and articles hereafter received may not appear until our number for JUNE, 1934!

This condition obliges us to enforce certain principles on which our publication always has been based. Our own members and our subscribers will be given preference in publication in that order. From these, articles will be accepted preferentially and published on the following bases: First, articles on Long Island insects; followed in order by those on New York State insects, then on the United States Fauna, then on the Americas in general. Articles on other faunas or on other groups than insects proper will be accepted only if we have room; and ALWAYS subject to delay.

All other things being equal, short papers, particularly in semi-popular style or on insect biology will be published as promptly as possible; others must wait, if necessary. Two types of articles will NOT be accepted during 1934, or beyond, if present conditions do not improve. These articles are: bare faunal lists; and, especially, inadequate taxonomic papers, including those descriptions of minor categories, such as subspecies, varieties, aberrations, and all such other refinements of classification. Nor will we accept isolated descriptions of new forms nor those papers in which new species are not adequately differentiated from their congeners.

In the matter of plates and figures we will adhere to our already announced policy (see BULLETIN, vol. XXVIII, no. 2, p. 80, On Wisdom).

The matter of reprints is now under advisement, but such papers as have already been submitted before we make public announcement of our decision will receive (on request ONLY), the usual 25 free reprints and any further number at the current rates.

What precedes is the formal decision of our Publication Committee, arrived at with the greatest reluctance, but needs must when the devil drives.

J. R. DE LA TORRE-BUENO, *Editor*,
For the Publication Committee, B. E. S.

PROCEEDINGS OF THE SOCIETY.

MEETING OF FEBRUARY 16, 1933.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday, February 16, 1933, at 8.20 p. m.

President Davis in the chair and ten other members present, *viz.*, Messrs. Cleff, Engelhardt, Lemmer, Moennich, Nadeau, Nicolay, Schaeffer, Siepmann, Torre-Bueno, and Wurster, and Mr. Stecher, Mrs. Moennich and Mrs. Nadeau.

The minutes of the previous meeting were read and approved, and a monthly report was presented by the treasurer.

Mr. Engelhardt proposed for membership Mr. J. H. Clemer, Harrisonburg, Va. It was regularly moved and seconded that the By-laws be suspended, and the secretary was directed to cast one ballot for the election of Mr. Clemer, which was accordingly done, and the candidate was declared elected.

Mr. Davis exhibited specimens of *Tenodera angustipennis*, an introduced Asiatic mantis recently recorded from near Wilmington, Delaware. It somewhat resembles our now familiar *sinensis*, but has narrower fore wings. The differences between the egg masses of the two species is more striking than that between the insects themselves.

Specimens of *Lycophotia saucia* Hbn. and form *fuscobrunnea* Sfrd. from Lakehurst, N. J., were exhibited by Mr. Lemmer.

Mr. Nicolay spoke of his collecting trip to the Great Smoky Mountain region along the North Carolina-Tennessee line, where he paid particular attention to the Carabidae. The beetles of this family occur continuously from May until frost in this mountainous region, without any pronounced "off season" as is observed when collecting at lower altitudes.

On Mt. Leconte a pair of *Nebria appalachia* Darl., the smallest *Nebria* in the United States, were taken, as well as *Scaphinotus andreæsi* Harr. variety *tricarinatus* Casey and *Maronetus hubbardi* Schwarz. Typical *andreæsi*, which is found at lower elevations up to around 3,000 feet is purplish in color. *Tricarinatus* has a more cordate thorax, the elytral intervals are elevated basally, and is usually greenish in color, though occasional purplish specimens are found. It occurs higher up in the Great Smoky Mountains, and Mr. Nicolay believes that it well deserves the varietal name. The *Maronetus hubbardi* was taken by sifting, from 3,500 feet to the summit, but was not common.

On Clingman's Dome, *Scaphinotus viduus* Dej. variety *irregularis* Beut., *Trechus schwarzi* Jeann. and *Microtrechus barberi* Jeann. were taken.

The *Nebria* and the two *Trechis* have been described within the last two years.

The meeting adjourned at 10.10 p. m.

CARL GEO. SIEPMANN, *Secretary*.

MEETING OF MARCH 16, 1933.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday, March 16, 1933, at 8.20 p. m.

President Davis in the chair and ten other members present, *viz.*, Messrs. Anderson, Ballou, Engelhardt, Lemmer, Ragot, Schaeffer, Sheridan, Siepmann, Wilford and Wurster, and Dr. Funderson, of the Brooklyn Botanic Garden, Messrs Pollard and Stecher.

The minutes of the previous meeting were read and approved, and the treasurer presented a brief report.

Mr. Davis spoke of the work of some species of American termites, exhibiting examples. Among these was a good sized portion taken from an old oak stump on Staten Island, New York, which had been built up from the chewed up wood of the stump. In the vicinity of San Antonio, Texas, the termites feed upon vegetation that grows above the ground, and because they shun the light, they cover up the stems of the plants which they are eating. After the stems have been eaten, only the hollow outside covering made by the termites remains. Mr. Davis also spoke on an interesting congregation of springtails observed by Dr. Frank Overton two miles north of Patchogue, Long Island, on January 24, 1933, exhibiting a photograph of two small patches of these insects upon the ground. While the patches were not of large size, the springtails were closely congregated, and must have consisted of many thousands of individuals.

Mr. Pollard exhibited a photograph taken at an entomological gathering 23 years ago, remarking that three of the men in the picture were now present.

Mr. Engelhardt spoke of his trip through the Scandinavian countries to the North Cape, illustrating his talk with photographs and specimens collected during the trip. A brief general discussion of the Scandinavian countries and Greenland and the characteristics of their people followed. Mr. Engelhardt's paper will be published separately in the BULLETIN.

The meeting adjourned at 10.10 p. m.

CARL GEO. SIEPMANN, *Secretary*.

MEETING OF APRIL 13, 1933.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on Thursday, April 13, 1933, at 8.20 p. m.

President Davis in the chair and 14 other members present, *viz.*, Messrs. Anderson, Bell, Cleff, Engelhardt, Glanz, Lemmer, Moennich, Ragot, Schaeffer, Shoemaker, Siepmann, Torre-Bueno, Wilford, Wurster and Messrs. Pollard, Rummel and Stecher.

The minutes of the previous meeting were read and approved. The treasurer presented an informal report, and Mr. Torre-Bueno spoke briefly for the publication committee.

Mr. Moennich, speaking for the outing committee, stated that he had planned a few collecting trips for the coming season, and asked whether any members cared to act as leaders for any additional trips.

Mr. Engelhardt exhibited some specimens of the alpine flora he had collected on his trip to the Scandinavian countries last summer, remarking that the alpine floras of both hemispheres were somewhat similar. He said that it was not difficult to name arctic plants when visiting these regions in Europe, since most of the hotels had named specimens planted on their grounds.

Mr. Siepmann exhibited a specimen of *Miscodera arctica* (Carabidae) collected by Mr. Engelhardt at Hammerfest, Norway, and another specimen of the same species nearly exactly similar in appearance, from Selkirk, Yukon Territory, Canada. He also exhibited specimens of *Bembidion ustulatum* collected by Mr. Engelhardt at Norvik, Norway, and local specimens of *Bembidion tetracolum*, the two species being formerly considered identical.

Under the title "Notes on Some Poisonous Caterpillars," Mr. Charles L. Pollard described his experience in Brazil with the larva of *Dirphia tarquinius*, a Saturnid moth, as well as with species of the Lasiocampid genus *Megalopyge*. He then told of a severe attack of poisoning in Maine last summer, the result of contact with a Noctuid caterpillar of the genus *Apatela*. Urticating larvae are few in this family, but are numerous among the Megalopygidae, Eucleidae, Lymantriidae and Lasiocampidae.

Poisonous hairs, Mr. Pollard explained, are of two kinds: the primitive type, or seta, which retains its properties even after being shed; and a modified type in which several short spicular hairs form telescoped units, each inserted in a cuplike structure on the integument. This form of hair is well illustrated in the larva of the brown-tail moth, *Euproctis chrysorrhoea*. Another group of poisonous larvae includes those bearing permanent branched spines, as in the Saturnid genus *Automeris* and its allies.

The nature of the poison in urticating hairs and spines has not been determined, according to Matheson in "Medical Entomology." The suggestion is made that it has an acid reaction, owing to the fact that alkaline applications help to sooth the irritation.

Mr. Rummel, of the Newark Entomological Society, reported his observations on *Magacidada septendecim* and *cassinii*, made at Green Village and New Vernon, N. J., between the dates of May 20 and July 3, 1928. No larvae or adults were found on May 20, but on May 30 at New Vernon the larvae were plentiful under stones and logs and on June 7th the adults appeared in fair numbers, becoming very abundant from then on. Mr. Rummel emphasized the distinctive song, habits and mating of the form *cassinii* and, based on his observations, he believes it is entitled to specific rank.

Mr. Rummel also spoke on the possibility of obtaining single brooded races of lepidoptera normally double brooded, and on the red margined variety, *rubromarginata*, of *Actias luna*, which he had bred independent of the typical specimens, the larva of this variety being differently marked, as well as the adult.

In connection with this subject, Mr. Davis read his notes on the Red-margined Luna, published in *Psyche*, vol. XIX (1912). He said that his experience seemed to indicate that *rubromarginata* was a seasonal form, since he had examined many specimens in his own and other collections, collected out-of-doors, and they had been invariably collected on early dates. Specimens of *Actias luna* and its variety were exhibited by both Messrs. Davis and Rummel, the former showing a long series arranged according to their date of capture.

Mr. Rummel also exhibited a small branch collected high on a tree, out-of-doors, at Newark, N. J., on which there was an aggregation of fifty-seven *Cynthia* cocoons. He said that it was evident that all the caterpillars that had spun their cocoons on this branch had not been feeding there, and raised the problem of how the larvae came to congregate there. He pointed out, even if the larvae feeding on adjacent branches had known of the presence of other larvae spinning cocoons there, he did not see how they could have been intelligent enough to follow the branch down to where the limb joined the trunk of the tree, then follow the trunk to where the other limb joined it, and then crawl out on the limb on which the cocoons were being spun.

The meeting adjourned at 10.15 p. m.

CARL GEO. SIEPMANN,
Secretary.

MEETING OF MAY 11, 1933.

A meeting of the Brooklyn Entomological Society was held Thursday evening, May 11th, 1933.

President Wm. T. Davis in the chair. Other members attending were Messrs. Engelhardt, Ballou, Wurster, Moennich, Shoemaker, Cleff, Stecher, Naumann, Nicolay and Sheridan. Five visitors were present.

In the absence of the secretary, Mr. Siepmann, the chairman asked Mr. Wurster to act as secretary for the meeting. The minutes of last month's meeting were read and approved.

Treasurer Engelhardt submitted his financial report for the month of April, showing a total cash balance of \$1080.02 in the two banks.

Chairman Wm. T. Davis read extracts from his paper, "Dragonflies of the Genus *Tetragoneuria*," which will shortly appear in full in the Society's BULLETIN. His talk was accompanied by illustrations and mounted specimens of the various species and forms covered.

Mr. Herman Moennich delivered a most interesting extemporaneous talk on "An Entomological Hike over the Long Trail," which he negotiated alone last June 4th to 18th, covering the Green Mountain district and the Presidential Range.

The meeting adjourned at 9.35.

C. WM. WURSTER.

Secretary pro tem.

FIELD NOTES.

Re-discovery of a Lost Species.

On June first, I ran into a small colony of *Oeneis* species, (*Rhopalocera*), in the White Mountains of Arizona, which being sent to F. H. Benjamin, of the U. S. National Museum, proved to be the long lost *daura* Strecker, only the female type of which had heretofore been known, now in the Field Museum of Chicago. These butterflies were taken on open grass meadows about 10,000 feet elevation. It is interesting to note that the type locality of Strecker's type was Mt. Graham in the Graham Mts., which locality is just forty miles southerly by air line from where I rediscovered them and is the first locality southerly of the same elevation. Undoubtedly Strecker's specimen was blown south by prevailing high winds at that time of year which would account for the species not having been found on Mt. Graham since.—DOUGLAS K. DUNCAN, Globe, Arizona.

EXCHANGES

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

COLEOPTERA.—Am interested in exchanging Coleoptera. Carl G. Siepmann, R. F. D. No. 1, Box 92, Rahway, N. J.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa*, *macaria*, *mormonia*, *malcolmi*, *nokomis*; *Melitaea neumogeni*; *Lycaena speciosa*; etc. Send lists. Dr. John A. Comstock, Los Angeles Museum, Exposition Park, Los Angeles, Calif.

CATOPINI: *Catops* (*Choleva*), *Prionochaeta*, *Ptomaphagus*.—Wanted to borrow all possible specimens of these genera from North America for a revisional study. Correspondence solicited.—Melville H. Hatch, Dept. of Zoology, Univ. of Wash., Seattle, Wash.

HISTERIDAE.—Desire to obtain material, all localities, for identification, by purchase or exchange of other families. Chas. A. Ballou, Jr., 77 Beekman St., New York, N. Y.

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BUY OR EXCHANGE: Pinned Microlepidoptera and papered Pieridae of North America. Full data with all specimens. Named material of all groups offered. Alexander B. Klots, University of Rochester, Rochester, N. Y.

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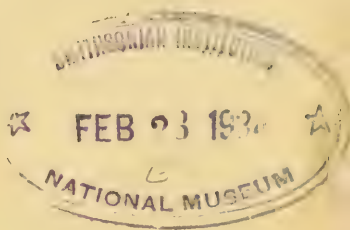
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CARL GEO. SIEPMAN

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PHYTOCORIS FALLEÑ—TWELVE NEW SPECIES FROM THE WESTERN UNITED STATES (HEMIPTERA, MIRIDAE).

BY HARRY H. KNIGHT, Iowa State College, Ames, Iowa.

For the past few years the writer has been working toward a monograph of the North American species of *Phytocoris*, probably the largest genus in the family Miridae. Up to the present writing, 132 species have been described from the United States and Lower California. Adding twelve new ones raises the total to 144 species. Consulting my manuscript catalogue of the Miridae for the world, I count 291 names in the genus that represent species in good standing. The present quota of twelve species raises the total number to 303 species for the world. Difficulties attending publication of long papers leads me to publish on the new species as rapidly as I have opportunity to work them out. Sometime I expect to publish keys to the species but this may await publication of a Manual treating the whole family for north of Mexico.

Phytocoris rolfsi n. sp.

Allied to *laevis* Uhler but differs in the pale and fuscous brown coloration, also distinguished by the longer and more convex frons.

♂. Length 9.5 mm., width 2.6 mm. Head: width 1.18 mm., vertex .443 mm., from base of eyes to tip of frons .67 mm.; frons strongly produced, convexity almost conical in form, extending beyond and overhanging the tylus, each side of frons with seven or eight oblique, slender brown lines; antero-dorsal angle of lora with tubercle projection as in *laevis*. Rostrum, length 2.73 mm., reaching to near hind margins of posterior coxae, pale to brownish, apex black. Antennae: segment I, length 2.16 mm., thickness at base .173 mm., tapering to more slender on apical half (.13 mm.) then enlarged at apex, color grayish white, irregularly sprinkled with fine

brownish dots, clothed with inconspicuous pale pubescence and intermixed with a few somewhat longer white hairs; II, 4.74 mm., slender, cylindrical, pale to dusky brown on apical half; III, 2.38 mm., slender, finely pale pubescent, dusky to fuscous at apex; IV, broken. Pronotum: length 1.17 mm., width at base 1.99 mm.; mesoscutum rather broadly exposed as in *laevis*, but the scutellum not so strongly convex on apical half.

Dorsum clothed with rather closely appressed silvery, sericeous pubescence which on darker areas becomes golden yellow as on inner half of clavus, interspersed on corium and inner half of cuneus with more erect short fuscous hairs. General coloration pale and shaded with fuscous and brown; scutellum with black mark each side on margin before apex, dark specimens with geminate wedge on mesoscutum and extending upon base of scutellum but the dark color separating into dots; spot behind inner angles of calli, anterior angles of pronotal disk and collum just opposite, stripe each side on mesoscutum and a spot near inner angle of cuneus, black. Hemelytra with pale to white ground color, more or less darkened by fusco-brownish, the dark color breaking into reticulations, the darker areas as on middle and inner apical half of corium inclosing pale irrorations; inner half of clavus brownish to fuscous, but invaded at base by paler spots; cuneus fully twice as long as wide at base, sprinkled with fuscous brown dots. Membrane and veins pale to white, bordering veins within cells and a curving ray each side behind areoles and attaining apex of membrane, fusco-brownish, the dark color breaking into spots and reticulations at margins; anal vein fuscous, behind this the inner marginal area of membrane sprinkled with fuscous dots. Legs pale and marked with fuscous and brown, femora reticulate with fusco-brownish, darker on apical half so that the pale color may show as irrorations; tibiae largely pale, tips fuscous, bases marked with brownish, tarsi blackish. Venter shaded and marked with fuscous and brown, the dark color tending to emphasize a pale lateral line. Genital claspers exhibit a close relationship with *laevis* Uhler, but tip of right clasper provided with a longer and a stronger incurved claw.

♀. Length 8.7 mm., width 2.5 mm. Head: width 1.17 mm., vertex .52 mm. Antennae: segment I, length 2.16 mm.; II, 4.07 mm.; III, 2.03 mm.; IV, .85 mm. Pronotum: length 1.17 mm., width at base 2.07 mm. Very similar to the male in form, pubescence and coloration.

Holotype: ♂, Sept. 23, 1931, Wiley City, Washington (A. R. Rolfs); author's collection. *Allotype*: ♀, Sept. 15, 1932, Yakima, Washington (A. R. Rolfs). *Paratypes*: ♂, taken with the type on

rabbit bush (*Chrysothamnus nauseosus* Pall.). 8♀, Sept. 15, 1932, Yakima, Washington (A. R. Rolfs), taken with the allotype on *Chrysothamnus nauseosus* Pall. ♂, Aug. 15, 1931, Yakima; ♀, Sept. 3, 1932, Tampico, Washington (A. R. Rolfs).

Mr. Rolfs writes: "When I took these *Phytocoris* the bushes were swept over once without getting anything, and then on the second time over I took these specimens. I do not know whether they were down in the bushes and I stirred them up, or if it was the time of day, or what. All that I have taken so far were caught between 4:30 and 6:00 p. m. I have swept sage brush a half day at a time before and since these specimens were taken without any luck, so perhaps I did pretty well in getting these eight or ten in an hour or so one afternoon."

***Phytocoris roseipennis* n. sp.**

Allied to *roseotinctus* Knegt., but size larger; distinguished by three longitudinal white lines on pronotum and scutellum, longer head, and in structure of male genital claspers.

♂. Length 8.36 mm., width 2.3 mm. Head: width 1.08 mm., vertex .54 mm.; elongated, from base of eyes to tip of tylus .91 mm., from base of eyes to apex of frons .71 mm.; frons convex apically, tylus prominent, deeply impressed at base; eyes set at an oblique angle, their base distinctly removed (.12 mm.) from collar; white to yellowish, tinged with roseus on tylus, median line of vertex and frons white, obsolete lines on frons roseate. Rostrum, length 4.24 mm., reaching upon seventh ventral segment, fuscous to blackish, basal segment pale and reaching beyond middle of front coxae. Antennae: segment I, length 2.12 mm., nearly cylindrical (.17 mm. thick at middle), slightly thicker near base, clothed with white pubescence and erect white hairs, length of hairs equal to or slightly exceeding thickness of segment, tinged with roseus and dusky; II, 3.94 mm., dusky brown, paler at base, clothed with short pale pubescence; III, 2.38 mm., dark brown to fuscous; IV, 1.3 mm., fuscous. Pronotum: length 1.47 mm., width at base 2.08 mm.; basal margin sinuate at middle, collar rather broad and flat.

Dorsum clothed with fine silvery, sericeous pubescence and intermixed with more erect white hairs, the latter longer and more prominent on pronotum and head. General coloration pale, the dorsum roseus, more strongly colored on hemelytra, a sharply defined, median, longitudinal white line on scutellum, pronotum and extending upon head, also a somewhat broader white stripe each side of this median line, dividing each half of disk into quarters, the stripe continuing across mesoscutum and on lateral margins of scutellum; this pale

stripe may also be recognized upon head behind and in front of the dorsal half of eyes. Hemelytra roseus, embolium and edge of corium, cuneus except inner margin, claval vein and inner margins of clavus pale to white. Membrane dark fuscous, cubitus pale, a reddish callus mark bordering cubitus before apex of larger areole. Legs pale to yellowish, femora tinged with roseus and dusky brown, irrorate with pale dots, set with prominent, erect white hairs; tibiae yellowish white, apices fuscous, spines brownish, tarsi and claws brownish to black. Venter roseate, a moderately broad, longitudinal white line each side, dorsal edge and base of abdomen pale. Genital claspers distinctive, form of right clasper very similar to that of *confluens* Reut., but otherwise not related; wall of genital segment with a blunt tubercle at the angle above base of left clasper.

♀. Length 7.4 mm., width 2.5 mm., brachypterous. Head: width 1.08 mm., vertex .61 mm. Antennae: segment I, length 2.3 mm., roseate; II, 4.07 mm., uniformly dusky brown; III, 2.47 mm., fuscous, pale at base; IV, 1.25 mm., blackish. Pronotum: length 1.12 mm., width at base 1.64 mm. Hemelytra brachypterous, leaving three abdominal segments exposed; cuneus present but short and rounded; membrane represented by a small flap. Dorsum paler than in the male, corium with a longitudinal fusco-brownish stripe (this stripe apparent in the male but largely obscured by the roseate coloration); scutellum with roseate stripe each side of the white median line; femora and venter roseate as in the male, the tergites of the abdomen roseate except for white median line.

Holotype: ♂, Sept. 20, 1928, Santa Cruz Co., Arizona (A. A. Nichol); author's collection. *Allotype*: same data as type. *Paratypes*: 3♂, 8♀, taken with the types (A. A. Nichol), "on grasses." ♂, ♀, Sept. 29, 1929, Patagonia, Arizona (E. D. Ball). ♂, Sept., 1906, Nogales, Arizona (A. Koebele). ♀, Sept. 8, ♂, Sept. 13, 3♀, Sept. 16, 3♂, 1♀, Sept. 23, 1927, Texas Canyon, Chiricahua Mts., Cochise Co., Arizona (J. A. Kusche), collection of California Academy of Sciences.

Concerning this species Mr. A. A. Nichol wrote as follows: "Yesterday I was out for a few minutes and took some Mirids which I know will prove interesting to you. Two of these were taken from a gramma grass, pitifully small relics of it which still hang on in very, very small spots and which I am afraid will soon disappear because of over-grazing."

"The Phytocoris species with the short winged females were collected in those grass relics I mentioned. I took Professor McGinnies, our range specialist, to examine them and he says *Hilaria* sp.,

Aristida spp., and a sprinkling of *Velota* and slender gramma (*Bouteloua*) make up the majority of the plots."

***Phytocoris fuscipennis* n. sp.**

Allied to *roseipennis* but differs in the shorter first antennal segment which is blackish beneath; hemelytra fuscous, costal margin pale; genital segment without tubercle above base of left clasper.

♂. Length 9.2 mm., width 2.5 mm. Head: width 1.12 mm., vertex .58 mm., viewed from above the tylus projecting prominently beyond the frons, from base of eyes to tip of tylus .82 mm., from base of eyes to apex of frons .65 mm. Rostrum, length 4.5 mm., reaching upon sixth ventral segment, brownish to black. Antennae: segment I, length 1.49 mm., nearly cylindrical but thicker (1.7 mm.) near base, pale above, blackish beneath, clothed with pale pubescence and white erect hairs, the latter more abundant on inner surfaces, length of hairs about equal to thickness of segment; II, 3.85 mm., cylindrical, pale yellowish brown, a blackish spot beneath at base; III, 2.12 mm., brownish; IV, 1.21 mm., fuscous. Pronotum: length 1.34 mm., width at base 1.99 mm., very slightly sinuate on middle of base. Scutellum moderately and evenly convex, fuscous to blackish, median line and sides paler.

Dorsum clothed with recumbent, somewhat sericeous, pale pubescence, intermixed with longer and more erect white hairs, the latter longer and more prominent on margins of pronotum and basal half of hemelytra. General coloration pale and darkened with fuscous; clavus and corium rather uniformly darkened, outer margin of corium tinged yellowish, embolium and narrow outer margin of cuneus white. Sternum, xyphus and gula blackish, face largely infuscated. Legs pale to dusky brown, coxae blackish, hairs and pubescence whitish, tibial spines brownish, tarsi fusco-brownish. Venter pale yellowish to fuscous, darker on ventral surface of genital segment. Genital structures distinctive, left clasper rather similar to *roseipennis* but without tubercle above base; right clasper more slender, ligulate and with small claw at apex.

Holotype: ♂, September 23, 1927, Texas Canyon, alt. 5700 ft., Chiricahua Mts., Arizona (J. A. Kutsche); collection of California Academy of Sciences. *Paratypes*: 25♂, Sept. 23; 1♂, Sept. 16, taken with the type in trap light (J. A. Kutsche). ♂, July, 1923, Douglas, Arizona (H. Letcher). No doubt the female of this species is brachypterous which explains why no females were taken at a trap light.

***Phytocoris longirostris* n. sp.**

Allied to *roscipennis* but differs in being rather uniformly pale in color, by the longer rostrum which attains base of genital segment in the male, and by the shorter first antennal segment; male distinguished by lack of a tubercle above base of left clasper. Differs from *fuscipennis* by the pale coloration, longer rostrum and smaller size.

♂. Length 7 mm., width 2 mm. Head: width 1.04 mm., vertex .54 mm.; tylus and apex of frons somewhat less prominent than in *roscipennis*, uniformly pale yellowish. Rostrum, length 4 mm., attaining base of genital segment, yellowish to brown, the apical segment blackish. Antennae: segment I, length 1.25 mm., yellowish white, pale pubescent, bearing erect white bristles, length of a few exceeding thickness of segment; II, 2.94 mm., dusky yellow, pale pubescent; III, 1.82 mm., fusco-brownish, narrowly pale at base; IV, 1.21 mm., fuscous. Pronotum: length 1.08 mm., width at base 1.66 mm.; basal margin sinuate at middle, collar rather broad and flat.

Dorsum clothed with recumbent, slightly sericeous, white pubescence and intermixed with more erect, longer white hairs. General coloration pale yellowish to white, an obsolete longitudinal white line is evident on scutellum and less distinctly on pronotum and head. Membrane uniformly pale fumate, veins white, cubitus dusky except apically, an opaque whitish callus bordering cubitus before apex. Legs uniformly pale yellowish, white pubescent, tibial spines yellowish brown, tarsi and tips of tibiae brown to dusky brown. Genital segment without tubercles, the claspers rather similar to *fuscipennis* in form but right clasper more slender apically and with longer claw.

♀. Length 6.3 mm., width 2 mm., brachypterous. Head: width 1.12 mm., vertex .69 mm. Rostrum, length 4.5 mm., reaching beyond base of ovipositor or to middle of segment eight. Antennae: segment I, length 1.6 mm., uniformly yellowish white; II, 3.46 mm., whitish, becoming brownish apically; III, 2.16 mm., dusky brown; IV, 1.3 mm., fuscous. Pronotum: length .95 mm., width at base 1.47 mm. Hemelytra brachypterous, leaving three or four abdominal segments exposed; cuneus evident as a rounded flap, membrane scarcely evident. General coloration pale yellowish to white, a brownish cloud sometimes evident on middle of corium.

Holotype: ♂, September 19, 1928, Tucson, Arizona (A. A. Nichol); author's collection. *Allotype*: same date as type. *Paratypes*: ♂, ♀, taken with the types by Mr. Nichol on the same grasses described for *roscipennis*. ♀, July 25, 1922, Douglas, Arizona (H. Letcher).

Phytocoris seminotatus n. sp.

Allied to *fuscipennis* but head shorter and eyes vertical; differs in the pale color, a dusky spot only on apical area of corium; membrane conspurcate within the areoles and two spots on apical half.

♂. Length 7.6 mm., width 2.4 mm. Head: width 1.12 mm., vertex .49 mm.; vertical, frons convex apically, prominent, tylus not visible as viewed from above, deeply impressed on base and separated from frons; antero-dorsal angle of lora projecting as a tubercle; eyes large, vertical in position. Rostrum, length 2.73 mm., reaching upon third ventral segment, pale, apex blackish. Antennae: segment I, length 1.56 mm., thicker (.15 mm.) near base, and tapering to more slender (.12 mm.) on apical half, and thicker (.13 mm.) again at apex, uniformly pale yellowish, white pubescent, beset with numerous white bristles, the length (.21 mm.) of many distinctly greater than thickness of segment; II, 2.94 mm., cylindrical, pale to brownish, white pubescent; III, 1.86 mm., yellowish brown; IV, 1.12 mm., pale fuscous. Pronotum: length 1.17 mm., width at base 1.96 mm., basal margin arcuate, only very slightly sinuate at middle. Scutellum moderately, evenly convex, uniformly pale yellowish.

Dorsum clothed with fine silvery white, sericeous, recumbent pubescence and more erect simple white hairs, also interspersed with a few erect fuscous bristles, particularly on apical area of corium, disk of clavus and basal half of pronotal disk. General coloration pale yellowish to white, apical area of corium dusky, cuneus dusky to pale fuscous on apical half. Membrane and veins white, within the areoles, a submarginal spot behind cuneus and larger area on apex of membrane, conspurcate or reticulate with fuscous. Legs pale yellowish to white, hind femora darkened with fuscous-brown to reddish-brown, thickly irrorate with small and a few large white spots; tibiae white, clothed with white hairs, spines brown, apical half of hind tibia bearing black micro-setae; tarsi brownish, apical segment blackish. Ventral surface yellowish to white. Genital segment distinctive, a prominent blunt tubercle projecting posteriorly from the angle of segment wall just above base of left clasper, a smaller but distinct tubercle in like position above base of right clasper. Claspers rather similar in structure to those of *longirostris* but distinguished by the tubercles; otherwise the species differ greatly in form of head and length of rostrum.

♀. Length 6.8 mm., width 2.3 mm. Head: width 1.04 mm., vertex .52 mm. Rostrum, length 2.73 mm., reaching upon third or fourth ventral segment. Antennae: segment I, length

1.51 mm.; II, 2.81 mm.; III, 1.81 mm.; IV, 1.17 mm. Pronotum: length 1.12 mm., width at base 1.95 mm. Very similar to the male in form, pubescence and coloration.

Holotype: ♂, September 19, 1928, Tucson, Arizona (A. A. Nichol); author's collection. *Allotype*: same data as the type. Mr. Nichol took these specimens on grasses, evidently one of the species mentioned under the description of *roseipennis*. ♂, ♀, Sept. 16, ♂, 2♀, Sept. 23, ♀, Sept. 30, ♂, Oct. 1, ♂, ♀, Oct. 14, 1927, Texas Canyon, Chiricahua Mts., Arizona (J. A. Kusche). 2♂, Sept., 1906, Nogales, Arizona (A. Koebele); coll. Calif. Acad. Sciences.

***Phytocoris difformis* n. sp.**

Not closely allied to any described species; belongs to the group with conspurcate membrane and bearing some deciduous, black scale-like hairs on the dorsum; scutellum sharply convex behind middle, hind femora strongly tapered on apical half.

♂. Length 5.5 mm., width 1.95 mm. Head: width 1.04 mm., vertex .37 mm.; vertical in position, tylus not visible as viewed from above, tylus arcuate, lora strongly exerted, eyes rather large; frons with several oblique black lines on each side, lower half of face white, irregular mark across middle of tylus, dorsal margins of lora and bucculae, reddish black. Rostrum, length 2.9 mm., reaching upon sixth ventral segment, dark brownish, basal segment white. Antennae: segment I, length 1.38 mm., slightly thicker near base, tapering to slightly more slender apically, black, with several more or less confluent white spots on dorsal aspect, black pubescent, provided with several bristle-like white hairs, length of these hairs not exceeding thickness of segment; II, 2.8 mm., black, with white band at base and one at slightly beyond middle; III, 2.38 mm., black, narrow white band at base; IV, 1.17 mm., brownish black. Pronotum: length .95 mm., width at base 1.82 mm.; disk grayish to blackish, narrow basal margin pale and bordered with black line of varying width; bordering calli behind, dorsal margin of propleura and a mark across middle of coxal cleft, black. Scutellum sharply convex at slightly behind middle, black, an X-like pale mark with crossing point on the center of convexity, the apex of scutellum sharply depressed and with oblong black mark on median line.

Dorsum clothed with simple, short black pubescent hairs, intermixed with closely appressed, white sericeous pubescence, the whole intermixed with deciduous, black scale-like hairs; the erect black hairs prominent on collar, apex of clavus, and

two tufts on membrane margin of cuneus and paracuneus. Hemelytra grayish white and marked with blackish, claval vein, inner margin of corium, spot before middle and radial vein, embolium except for a few small spots, paracuneus, inner margin and apex of cuneus, black or shaded with black. Membrane white, thickly conspurcate and reticulate with fuscous to black, two white spots on membrane margin behind cuneus. Sternum black, margins of epimera and the ostiolar peritreme white. Legs white and marked with black, front and middle femora with blackish reticulations due to coalescing white spots; hind femora thick at middle and tapering sharply to slender at apex, black except base, thickly marked with both large and small coalescing white spots; tibiae black, front pair triannulate with white, the middle pair with four white bands, hind tibiae largely blackish and checkered with white glabrous spots from which arise either white or black spines. Venter chiefly blackish, marked with white spots which laterally and beneath coalesce to give a pale ground color upon which remnants of blackish reticulations may be traced. Genital segment without tubercles, right clasper ligulate, tapering apically, terminating in a short thick claw which fits into a groove on terminal portion of left clasper.

♀. Length 6.2 mm., width 2.3 mm. Head: width 1.12 mm., vertex .48 mm. Antennae: segment I, length 1.81 mm.; II, 3.29 mm.; III, 2.16 mm.; IV, broken. Pronotum: length 1.04 mm., width at base 1.97 mm. Very similar to the male in form, color and pubescence.

Holotype: ♂, July 19, 1917, Texas Pass, Arizona (H. H. Knight); author's collection. *Allotype*: same data as the type. *Paratypes*: ♀, taken with the types on a tent trap light. ♀, July 15, 1917, Bonita, Arizona (H. H. Knight), at trap light. ARIZONA—♀, May 24, ♀, June 7, 1924, Tucson (A. A. Nichol). ♂, July 25, 2♂, July 22, ♂, ♀, Aug. 1, 1925, Tucson (A. A. Nichol & B. B. Streets). ♀, Sept. 2, 1926, Rincon Mts. (A. A. Nichol). ♂, May, 1929, Tucson (E. D. Ball). ♀, Baboquivaria Mts. (F. H. Snow). 3♀, July 25, ♂, July 27, 1924, Oracle (E. P. Van Duzee & J. O. Martin), on *Acacia greggi*. ♂, Aug. 11, Tucson, ♀, Aug. 10, 1924, Florida Canyon, Santa Rita Mts. (E. P. Van Duzee). ♂, Oct. 17, Maricopa; ♀, Aug. 22, 1927, Chiricahua Mts. (J. A. Kusche). ♀, June 7, 1930, Congress (G. Linsley).

Phytocoris varius n. sp.

Related to *palmeri* Reut. as indicated by three types of pubescence and conspurcate membrane, but differs in the

smaller size, paler color with speckled hemelytra, and in form of genital structures.

♂. Length 6.4 mm., width 2.1 mm. Head: width 1.08 mm., vertex .41 mm.; tylus visible from above, lora rather prominent; yellowish, frons with fine reddish marks, lower half of tylus, lora, upper half of juga, basal edge of bucculae, and two rays behind eye, blackish. Rostrum, length 2.64 mm., reaching upon sixth ventral segment, pale, apical half brownish to black. Antennae: segment I, length 1.17 mm., pale, fuscous beneath, brownish reticulations above, clothed with rather long white pubescence, intermixed with several white bristles which in length exceed thickness of segment; II, 2.73 mm., uniformly pale dusky, narrowly white at base; III, 1.69 mm., pale fuscous; IV, 1.08 mm., fuscous. Pronotum: length .83 mm., width at base 1.51 mm.; disk pale to dusky, lateral margins and a subbasal line fuscous to blackish, slender basal edge white, collar and calli yellowish, two spots on collar and inner angles of calli fuscous; propleura blackish, lower margin and ray across top of coxal cleft pale to yellowish. Mesoscutum and scutellum blackish, basal angles of scutellum and median line on apical half pale to white.

Hemelytra whitish, rather uniformly speckled with fuscous dots, each dot formed at the base of a black hair, radial vein except for interruption on middle, narrow inner margin and apex of cuneus, blackish. Dorsum clothed with sericeous, white pubescence, and intermixed with more erect fuscous to black simple hairs, the whole interspersed with deciduous, scale-like black hairs. Membrane white, rather evenly conspurcate with fuscous dots and reticulations, cubital vein opaque white, smaller vein fuscous. Sternum, pleura and venter rather uniformly blackish, ostiolar peritreme and lower margin of epimera white. Legs pale, base of hind and middle coxae with blackish spot, femora with brownish black lines and reticulations, dorsal aspect of hind femora black, a few small white spots on posterior aspect, ventral aspect pale with dark reticulations; tibiae pale, with brownish dots and reticulations on basal half, pubescent hairs white, spines brown. Genital segment distinctive, a moderate sized tubercle formed on wall somewhat above base of left clasper; left clasper of the simple curving type, right clasper ligulate, slightly bent near base, apical half tapering to a brown claw on apex.

♀. Length 5.9 mm., width 1.94 mm. Head: width 1.02 mm., vertex .476 mm. Rostrum, length 2.68 mm., reaching upon sixth ventral segment. Antennae: segment I, length 1.21 mm.; II, 2.75 mm.; III, 1.86 mm.; IV, 1.12 mm. Pronotum: length .78 mm., width at base 1.45 mm. Very similar to the male in form, color and pubescence.

Holotype: ♂, September 6, 1931, Grand Canyon (H. H. Knight); author's collection. *Allotype*: ♀, taken with the type. *Paratypes*: ♂, 3♀, taken with the types by beating on large cedar trees (*Juniperus* sp.) which were found growing behind the cabin camp located at the entrance gate of the Grand Canyon National Park. ♀, Aug. 13, 1925, Durango, Colorado (H. H. Knight). 3♂, June 20, 1928, alt. 6200 ft., Chiricahua Mts., Arizona (A. A. Nichol).

***Phytocoris calli* n. sp.**

Allied to *conspurcatus* Kngt., but distinguished by a median white line on mesoscutum and scutellum, third antennal segment with pale annulus only at base, while the second segment is largely pale and not sharply annulate.

♂. Length, 6.1 mm., width 2.1 mm. Head: width, 1.03 mm., vertex .38 mm. Rostrum, length 3.1 mm., reaching upon genital segment, pale, apical half brownish, apex blackish. Antennae: segment I, length 1.33 mm., white, dorsal aspect with three blackish areas which are separated by two white spots or bands, spines white to brownish; II, 2.75 mm., yellowish brown to fuscous, white at base, rather broadly paler at middle but not sharply annulate, the basal half with three obscure but evident paler spots; III, 1.6 mm., black, white only at base; IV, 1 mm., black. Pronotum: length .98 mm., width at base 1.75 mm. Mesoscutum dark with a distinct white median line which extends upon the largely pale scutellum, but upon the latter the pale line is bordered by dark color.

Dorsum clothed with black scale-like hairs and intermixed with white sericeous pubescence and simple black hairs much as in *conspurcatus*. Hemelytra conspicuously marked with white, corium with base, middle, and apex with prominent white areas, clavus whitish on inner margins, also with three or four white spots through the middle. Membrane much as in *conspurcatus* but paler, the cubitus white. Legs rather similar to *conspurcatus* but the hind tibiae with a broad white band on basal half. Genital characters indicate a close relationship with *conspurcatus* but the tubercle above base of left clasper appears longer in that it extends beyond the basal angle of the clasper, the latter being shorter in structure.

Holotype: ♂, from aspen grove, Brigham Young University campus, Timanogas, Utah (Anson Call, Jr.); author's collection.

***Phytocoris squamosus* n. sp.**

Differs from all described species in having a brush-like

fringe of hairs on ventral surface of first antennal segment; form slender, collar pale and marked with fuscous, clothed with appressed, silvery, scale-like pubescence and intermixed with simple fuscous hairs.

♂. Length 5.2 mm., width 1.4 mm. Head: width .82 mm., vertex, .43 mm., length from base of eyes to tip of tylus .62 mm., the tylus visible as viewed from above, basal half somewhat swollen and arcuate as viewed from the side, eyes oblique in position; frons and vertex nearly horizontal in position, only slightly convex, median line pale, with curving oblique fusco-reddish lines on each side of frons. Rostrum, length 2.42 mm., attaining base of fourth ventral segment, yellowish, apex blackish. Antennae: segment I, length 1.4 mm., clothed with long sericeous white hairs, forming a brush on ventral surface, length of hairs equal to and some exceeding thickness of segment, dorsal surface provided with a few white bristles, their length about equal to thickness of segment, color fuscous, with several coalescing white spots on dorsal aspect; II, 2.51 mm., brownish black, more blackish on apex, clothed with appressed, short white pubescence; III, 1.38 mm., black, base narrowly white; IV, 1.08 mm., black. Pronotum: length .84 mm., width at base 1.3 mm.; yellowish, calli and three or four obsolete rays reddish, narrow basal margin thickly coated with silvery scales, disk with finer and more yellowish, sericeous pubescence; collar strongly flattened, stricture shallow. Mesoscutum broadly exposed, sloping gradually to the moderately convex scutellum, brownish black, basal angles and apex of scutellum, including a partial median line, white, thickly covered with closely appressed, white scales.

Hemelytra white, largely clothed with white scales, but apical half of corium except edges and discal area of clavus, without scales and bearing simple fuscous pubescence; tip of clavus, two tufts on membrane margin of cuneus and paracuneus, apex of embolium and tip of cuneus bearing prominent black hairs; base of clavus, streaks on claval vein, two or three small spots and apex of embolium, radial vein, inner margin of clavus and continuing across paracuneus, inner margin and apex of cuneus, and small dots on disk of cuneus, fuscous to blackish. Membrane opaque white, conspurcate and reticulate with brownish black, an arcuate white band extending from apex of larger areole to tip of membrane, also two smaller white spots, one behind apex of cuneus and the second about half way to tip of membrane; veins yellowish white, base of anal vein with reddish. Legs white and marked with blackish, apical half of femora streaked and spotted with blackish, hind femora thicker on basal half, tapering sharply

to more slender on apical half, slightly curved, anterior aspect with two partially defined longitudinal blackish lines; tibiae yellowish to white, spines chiefly white but a few black mixed in, front pair with spots and apices fuscous, hind pair with small dots only; tarsi black. Venter white, thickly covered with white scales, a sharply defined lateral line, genital segment except bordering claspers, also more or less on basal part of seventh and eighth segments, black. Genital segment without tubercles, right clasper ligulate on basal half, apical half tapering to a sharp point and sloping upward; left clasper of the ordinary type, thick at base then tapering sharply to the slender apical half which in this case is black.

♀. Length 4.9 mm., width 1.38 mm. Head: width .82 mm., vertex .47 mm. Antennae: segment I, length 1.81 mm., II, 3.11 mm., black, with two or three white spots on basal half; III, 1.6 mm.; IV, broken. Pronotum: length .69 mm., width at base 1.04 mm. Membrane abbreviated, just attaining apex of abdomen, dorsal surface of abdomen thickly covered with silvery scales. Color and pubescence very similar to that of the male.

Holotype: ♂, July 15, 1917, Bowie, Arizona (H. H. Knight); author's collection. *Allotype*: ♀, July, 1929, Tucson, Arizona (E. D. Ball). *Paratypes*: 4♂, taken with the type. 3♂, 1♀, taken with the allotype. ♂, June 6, 1930, Mojave, California (R. L. Usinger). ♂, Oct. 14, 1927, Patagonia, Arizona (J. A. Kusche).

Phytocoris nigrisignatus n. sp.

Allied to *quercicola* Kngt. and relatives but distinguished from all known species by the short pubescence and pale color with distinctive black markings.

♀. Length 6.3 mm., width 2.2 mm. Head: width 1.04 mm., vertex .45 mm. Rostrum, length 3.11 mm., reaching upon fourth ventral segment, brownish black, first segment paler. Antennae: segment I, length 1.38 mm., cylindrical, slightly thicker near base, pale yellowish, basal construction blackish, ventral aspect with blackish line which becomes obsolete on basal half, clothed with short yellowish pubescence, also six or seven short yellowish spines, the longest not equal to thickness of segment; II, 3.0 mm., black, narrow band at base and rather broadly on middle, pale yellowish; III, 1.56 mm., uniformly yellowish; IV, broken. Pronotum: length 1.08 mm., width at base 1.73 mm.

Dorsum clothed with appressed, short, pale yellowish, sericeous pubescence and intermixed with more erect short fuscous hairs, the latter more prominent on pronotum. General

coloration pale yellowish and marked with black; pronotum except basal margin, median line, inner half of calli, dorsal aspect of collar and lower margin of propleura, black; broad stripe behind eyes, narrow stripe around antennal socket and extending across impressed base of tylus, mesosternum except median line, small mark on each lateral margin of scutellum before apex, four or five spots on embolium, inner apical angles of clavus, apex and inner margin of cuneus, black. Membrane white, speckled with scattering fuscous dots, within larger areole more thickly conspurcate, smaller areole and lateral vein blackish, cubitus yellowish, apex of membrane and small group of dots on lateral margin behind cuneus, fuscous dotted. Legs yellowish, femora irregularly marked with blackish on apical half, the hind femora more broadly black, irrorate with moderately large white spots; tibiae triannulate with alternating bands of pale and black, with black band at apex, middle, and middle of basal half; tarsi blackish, claws brownish. Venter uniformly yellowish, second and third segments with lateral fuscous mark.

Holotype: ♀, June 25, 1917, Victoria, Texas (H. H. Knight), taken on *Quercus* sp.; author's collection.

This species is so distinctive in coloration and pubescence I feel that it may be safely recognized from the female here described when next it comes to hand.

***Phytocoris albellus* n. sp.**

Allied to *ventralis* Van D. as indicated by the deciduous black and white scale-like hairs on the dorsum, but differs in the more slender first antennal segment, more vertical type of head, and nearly white color.

♀. Length 3.9 mm., width 1.56 mm. Head: width .78 mm., vertex .38 mm.; nearly vertical in position, tylus not visible from above, frons and vertex evenly convex, eyes moderate in size, vertical in position, posterior margin nearly in contact with collar, lora prominent. Rostrum, length 1.8 mm., reaching upon fourth ventral segment, yellowish brown, darker at apex. Antennae: segment I, length .74 mm., thickness .10 mm., cylindrical, slightly more slender on apical half, black, dorsal aspect with two large and three smaller white spots, with yellowish and black pubescence, beset with three or four pale bristles, length of one or two bristles exceeding diameter of segment; II, 1.88 mm., slender, yellowish brown, narrow white band at base, pale on middle and darker brown on apex; III, 1.04 mm., fuscous brown, pale at base; IV, .77 mm., blackish. Pronotum: length .64 mm., width at base 1.25 mm.

Dorsum clothed with fine, pale yellowish pubescence and fuscous hairs, intermixed with both black and silvery white, deciduous scale-like hairs. General coloration yellowish white, an oblique mark across inner apical angles of corium, mesoscutum, collar above, basal margin of pronotal disk, dorsal margin of propleura, mark across middle of coxal cleft, ray behind dorsal one-third of eye, mark across base of juga, spot on each side of tylus at middle, sternum, blotch on middle of eighth ventral segment, small dot each side on lateral margin of scutellum before apex, and tip of cuneus, black. Membrane dark fuscous, closely and thickly dotted and reticulate with white, two somewhat larger white spots along margin behind cuneus, veins fuscous, cubitus about apex of larger areole, white. Legs white, apical half of femora sparsely marked with irregular black reticulations which consolidate to form one or two black patches just before apex; front tibiae triannulate with black, middle and hind tibiae with bands indistinct except at middle, tarsi pale, tips fuscous.

Holotype: ♀, August 5, 1929, Payson, Arizona (E. D. Ball); author's collection. A pretty little white form that may be readily recognized by the black markings.

Phytocoris pulchellus n. sp.

Runs to *luteolus* Kngt. in my key (Hem. Conn., 1923, p. 644) but differs in the fuscous pronotum and uniformly greenish yellow clavus and corium; distinguished structurally by the shorter first antennal segment and in the male by a double tubercle above base of left genital clasper.

♂. Length 4.7 mm., width 1.56 mm. Head: width .86 mm., vertex .28 mm.; tylus and lora less prominent than in *luteolus*. Rostrum, length 1.86 mm., reaching upon fourth or fifth ventral segments. Antennae: segment I, length .97 mm., white, irregularly marked with orange, pale pubescent, provided with four or five white spines; II, 2.03 mm., uniformly yellowish brown; III, 1.08 mm., dusky brown; IV, broken. Pronotum: length .75 mm., width at base 1.38 mm.

Dorsum clothed with simple yellowish pubescence and more or less intermixed with silvery sericeous pubescence. General coloration yellowish to greenish yellow and marked with reddish; scutellum, clavus and corium uniformly greenish yellow, in darker specimens tinged with reddish; pronotum rather uniformly infuscated, tinged with reddish, collar, mesoscutum, base of corium and paracuneus, reddish; cuneus with yellow ground color, irregularly marked with coalescing red dots, the red color dominant in darkest specimens; head

irregularly marked with orange red, sternum, pleura, and venter orange to red. Membrane pale, conspurcate with nearly obsolete fuscous brown marks, veins fuscous to reddish, pale about apices of areoles. Legs pale to reddish, hind femora dark red except base, irrorate with small white spots and dots; tibiae pale, front pair with three obsolete orange bands, hind pair broadly reddish on base only; tarsi pale to yellowish brown, claws brown. Genital segment distinctive, provided with a double tubercle above base of left clasper, the outer one larger and more prominent, right side without tubercle; right clasper ligulate, narrowed toward tip, the apex terminating in a slightly curved claw.

♀. Length 4.7 mm., width 1.7 mm. Head: width .86 mm., vertex .34 mm. Antennae: segment I, length 1.12 mm.; r II, 2.3 mm.; III, 1.08 mm.; IV, broken. Pronotum: length .80 mm., width at base 1.43 mm. Form, pubescence and coloration very similar to the male except the dorsum generally with clearer greenish yellow.

Holotype: ♂, September 9, 1925, alt. 4500 ft., Santa Rita Mts., Arizona (A. A. Nichol); author's collection. *Allotype*: ♀, May 17, 1931, Santa Rita Mts. (E. D. Ball). *Paratypes*: ♀, April 19, 1924, Tucson, Arizona (A. A. Nichol). 3♂, 3♀, taken with the allotype on *Quercus oblongifolia* by Dr. E. D. Ball.

Tornados and Butterfly Migrations in Texas.—Following in the wake of tornados we learn of the migration of tropical butterflies well into the interior of Texas. H. B. Parks, State Agriculturist, reports the capture of 42 specimens of the genus *Gonepteryx* at San Antonio during the last week in August and the first week in September, 1933. Eight of these were *clorinde* and the others about equally divided among two other species. These huge butterflies, he writes, were a glorious sight. They arrived in large numbers and stayed with us for about a week. San Antonio appeared to be the center of their flight, but two also have records from Kerrville and Houston and I saw them at Austin. During that time and since I have collected six specimens of *Chiomaria asychis*, 1 *Callidryus philea*, 2 *Coloenis julia*, 1 *Heliconius charitonius*, 1 *Athena petreus* and 5 *Victorina steneles*.

While all of these and other tropical butterflies are listed by Holland as ranging across the Mexican border, their appearance in large numbers far inland is a notable experience. We should like to hear more of the extent of these migrations.—GEO. P. ENGELHARDT, Hartsdale, N. Y.

TWO NEW BEES FROM COLORADO.

By T. D. A. COCKERELL, Boulder, Colo.

These bees were bred by Mr. Chas. H. Hicks, and are described now in order that he may refer to them in connection with his biological observations.

Osmia caulicola sp. n.

♀. (Type). Length slightly over 6 mm., anterior wing 5 mm.; blue-green, the postscutellum yellowish green. The very broad abdomen steel blue, the margins of the tergites concolorous; antennae black, fourth joint very short; mandibles tridentate, black; clypeus very densely, confluent, punctured, the lower margin gently arched, and covered with pale reddish hairs, but disc of clypeus with thin long black hair, contrasting with the white hair on sides of face; front and occiput with pale hair, but vertex with scanty long dark hair; front densely punctured, with a median shining channel descending from middle ocellus; eyes pure black; mesothorax and scutellum closely punctured but shining, the scutellum with a median smooth line; area of metathorax dull; thorax above with long faintly fulvescent hair, and some black hairs intermixed, but so few that they can only be seen with a microscope; tegulae green in front; wings dusky hyaline, the marginal cell without a dark cloud, but dusky throughout; second cubital cell receiving recurrent nervures about equally far from base and apex; legs black, not at all metallic, the last tarsal joint rufous; hair on inner side of tarsi pale reddish; abdomen rough but somewhat shining, without evident bands; in lateral view some light hair can be seen on margins of tergites; ventral scopa black.

♂. Head, thorax and abdomen yellowish green, hair of head and thorax above distinctly fulvescent, with no admixture of black on head or thorax; flagellum long and slender, not moniliform, obscurely brownish beneath; hair of face pale fulvescent; hind tibiae slightly greenish; tarsi ordinary, the last joint red; hind basitarsi not dentate; abdomen with no ventral tubercle; sixth tergite with a small but distinct notch; seventh strongly bidentate.

Gregory Canyon, Boulder, Colorado, both sexes bred by Mr. Chas. Hicks, who will publish an account of his observations. The female runs nearest to *O. melanstricha* Lovell & Ckll., but is much smaller, and easily distinguished by the smooth channel down the

middle of the front. The male runs close to *O. pulsatillae* Ckll., but lacks the black hairs of that species.

***Alcidamea mucronata* n. sp.**

Male. Length about 8 mm. (abdomen curved downward at end), anterior wing nearly 6 mm.; black, including mandibles, antennae (flagellum very obscurely brownish beneath), tegulae and legs; dense hair of face and front, and long hair of vertex and thorax above, clear fulvous; hair dull white on under side of head and thorax; mouth parts very long, extending more than 4 mm. beyond head; scape greatly swollen; flagellum thick, crenulate below, with the spine-like apex produced and curved; vertex shining on each side of ocelli; eyes when fresh a beautiful light greenish blue; mesothorax and scutellum shining on disc, finely punctured; notauli linear; wings clear hyaline, with outer margin broadly dusky; stigma dusky reddish; marginal cell rather broadly rounded at end; basal nervure going slightly but evidently basad of nervulus; first recurrent nervure joining second cubital cell a considerable distance from base, the distance equal to more than half length of first intercubitus; second recurrent slightly nearer to end of cell; legs with pale hair, spurs dark reddish; abdomen shining but well punctured, tergites 1 to 5 with ochreous tinted pale hair-bands, broadly interrupted on first, and slightly on second; a strong spine at each side of sixth tergite, and a strong straight apical spine; second sternite with a very large transverse shining obtuse protuberance; third with a deep V-like emargination, beneath which is a fringe of white hair; fourth more broadly and shallowly emarginate.

Roggen, Morgan Co., Colorado, 4,718 ft., 1933 (Chas. H. Hicks). Bred from the nest, April 28, two males. Related to *A. uvulalis* Ckll., from the Mojave Desert, but smaller with strongly reddened hair on thorax, wings not yellowish, projection of second ventral segment different.

Contributions, queries and discussion are urgently solicited for our new section.

AN INTERESTING TWO-EYED SPIDER FROM BRAZIL (TETRABLEMMIDAE).

BY C. R. CROSBY, Ithaca, N. Y.

Prof. E. J. Hambleton sent me some time ago a small collection of minute spiders taken by sifting at Viçosa, Minas Gerais, Brazil, on May 12, 1930. Among them was a series of males and females with only two eyes. In attempting to place them generically I was at first struck by their close similarity to *Tetrablemma medioculatum* Cambridge, described from a single male from Ceylon (Proc. Zool. Soc. Lond. 1873, p. 114, pl. 12, f. 1). The species resembles this *Tetrablemma* in the form of the cephalothorax, in having a tooth on the face of the chelicerae near the base, and most strikingly in the form and arrangement of the plates on the abdomen, in fact, in this respect they are almost identical. It differs in the number of eyes (2 instead of 4), in their position and in having the spiracular plates present; in *Tetrablemma* they are evidently suppressed. Another species of *Tetrablemma*, *okei* Butler (Royal Soc. Victoria Proc. n. s. 44(2): 111, 1932) was described from Victoria, Australia. Butler states that the tarsi bear three claws but does not indicate whether a pretarsus is present or not. Neither the number nor the position of the tracheal spiracles is indicated.

Another form to which this species seems most closely related is *Diblemma donisthorpii* Cambridge (Proc. Dorset Nat. Hist. Club, 29: 188, pl. A. f. 7. 1908) described from specimens found in a hothouse in Kew Gardens, original habitat unknown.

Our species agrees with this form in the number of eyes but not in their position, in the double row of inward-directed hairs on the cephalothorax and in the presence of epigastric plates; although they seem to be soldered to the surrounding sclerite and may not be functional; it differs markedly in the number and arrangement of the abdominal sclerites. Cambridge states that a pretarsus is present but does not give the number of tarsal claws.

A third genus in this group is *Hexablemma* Berland, from British East Africa (Res. Sci. Voy. Alluaud and Jeannel Af. Orient. Ar. 4: 167. 1920). It is very close to *Tetrablemma* but has six eyes. The tarsi are armed with three claws. The position of the tracheal spiracles is not indicated.

It is evident that this Brazilian species possesses a puzzling combination of the characters of *Hexablemma*, *Tetrablemma* and *Diblemma*. Rather than place it in any of these it seems best to erect for it the new genus:

Matta.

Type, *Matta hambletoni* new species.

Its distinguishing characters are given above and in the description of the type species.

Matta hambletoni n. sp.

Male. Length, 1.4 mm. Cephalothorax orange-yellow, suffused with dusky except on the top of the head, viewed from above roughly octangular, the anterior side gently convex. Behind each eye there is a row of six small stiff hairs directed upward and inward. Cephalothorax viewed from the side very high, moderately arched behind to the base of the head where it rises perpendicularly, nearly straight on top of head and gradually ascending to a point just back of the eyes. The front and clypeus slanting steeply forward in a nearly straight line, slightly convex in the middle part. Only two eyes present, white, slightly oblique, separated by $2\frac{2}{3}$ times the diameter. Chelicerae, short, stout, armed on the face near the base with very narrow, short, blunt tooth; each chelicera armed mesally above the claw with a thin semitransparent plate-like tooth, the front margin concave, the mesal angle acute. Claw of chelicera rather stout, moderately curved. Sternum broad, clear yellow orange, sparsely clothed with stiff, fine black hairs, broadly truncate in front; the margin rebordered; hind coxae separated by more than the length. Labium short, transverse. Endites short, broad, convergent, meeting in a straight line in front of the labium, front margin straight. Legs paler than body, patella yellow. Coxae globular, trochanters very short, femora compressed, tarsal claws three, borne on a distinct pretarsus; the paired claws armed with a series of three or four long teeth of nearly equal length; unpaired claw slender, moderately curved. Just below base of this claw there is a rounded bulb-like pulvillus. Spines on the tarsi and metatarsi minutely plumose. Femur of first leg armed on the inside with a double series of eight or nine stiff hairs, tibia armed retroventrally near tip with two stiff spines and on the front surface near tip there is a diagonal row of five spines, metatarsus armed below near base with one stiff spine. Abdomen ovate, covered with hardened sclerites as follows: a large convex sclerite covering the greater part of the dorsal surface, followed posteriorly by three transverse sclerites which are narrowly separated on each side from three similar very narrow pleural sclerites, on the ventral side a very large sclerite surrounding the petiole and extending far forward, containing the epigastric plates,

rounded in front, truncate behind, followed posteriorly by two transverse sclerites, the anterior one the narrower, and last by a large circum-mammillary sclerite. The tracheal spiracles are very small, oblique, located behind and a little to the side of the epigastric plates. They are very difficult to see unless the specimen has been treated with caustic potash.

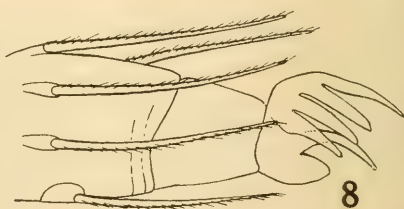
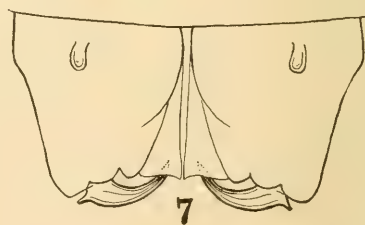
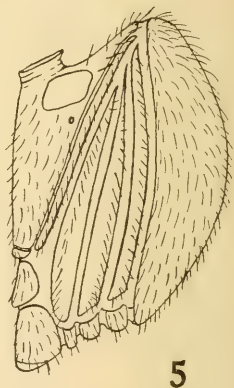
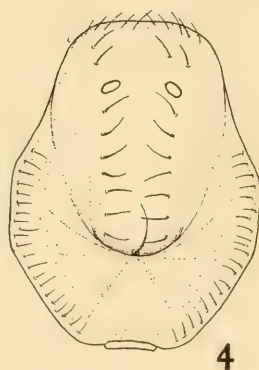
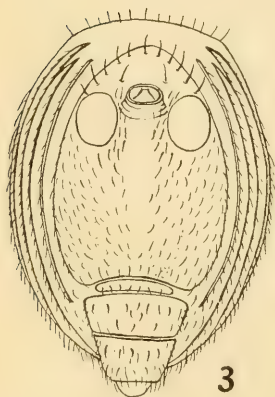
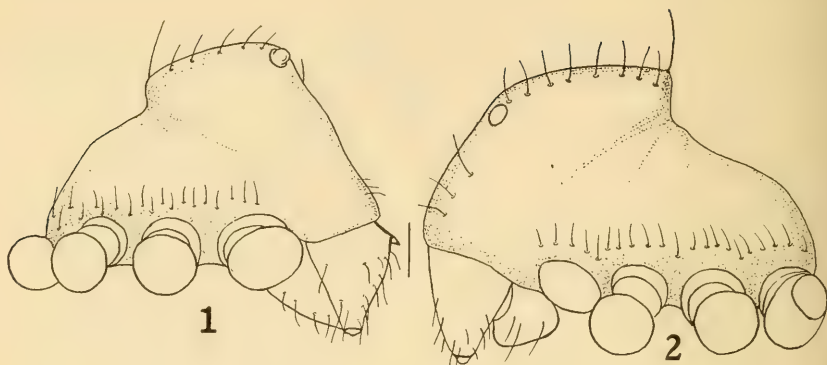
Femur of palpus a little broader at base than distally, armed at base ventrolaterally with a row of four long slender hairs and on the mesal side near tip with a pair of very small spines. Patella short, armed laterally with one fine hair. Tibia greatly enlarged, ovate, attached to the patella at the side, rounded at base, broadest in the middle, narrower distally. Tarsus very small, obliquely truncate, the dorsal margin pointed and bearing two very long, slender hairs; on each side there are two shorter hairs. The bulb extremely large, short pyriform; the seminal duct can be seen through the semitransparent integument. The embolus is terminal, black, slender, gently curved; it is accompanied by a shorter, slender, black process.

Female. A little larger than the male. Similar to the male in color. The eyes are farther forward and the clypeus is more convex. No tooth on front of chelicera. Palpi pale, slender.

Holotype, male; allotype, female. Viçosa, Minas Gerais, Brazil, May 12, 1930. 5 male paratypes. E. J. Hambleton collector. On July 6, 1933, Professor Hambleton collected 18♂, 24♀.

I am uncertain as to the family to which *Matta* should be assigned. It is evidently closely allied to *Hexablemma*, *Tetrablemma* and *Diblemma* and more remotely to *Hadrotarsus* Thorell (see Pocock, Ann. Mag. Nat. Hist. (7) 11: 619, 1903). In fact these four genera form a very compact natural group. They do not belong in the Theridiidae as proposed by Simon for *Tetrablemma* (Hist. Nat. Ar. 1: 573), and followed by Berland (1920) for *Hexablemma*, because of the nature of the respiratory system and the structure of the palpal organ. They are excluded from the Oonopidae, where Petrunkevitch (Syst. Ar. p. 88) placed *Diblemma* and *Tetrablemma*, because of the presence of an unpaired tarsal claw and because of the arrangement of the teeth on the paired claws, in a single, instead of a double series. In other respects they are very closely related to members of that family. In view of these considerations it seems best, for the present at least to revive for this group the family Tetrablemmidae proposed by Cambridge in 1873.

The drawings were made by Miss Helen M. Zorsch.



EXPLANATION OF PLATE.

Matta hambletoni: 1, male, cephalothorax from side; 2, female, cephalothorax from side; 3, female, abdomen from below; 4, female, cephalothorax from above; 5, female abdomen from side; 6, male, right palpus from the side; 7, male, chelicerae from in front; 8, male, tip of first leg, hairs omitted from pretarsus.

BEHAVIOR NOTES ON THE ASIATIC MANTIS
PARATENODERA SINENSIS REHN.

BY GEO. P. ENGELHARDT, Hartsdale, N. Y.

The Asiatic Mantis, now well established in many localities in New York State, is fast losing its notoriety as a dangerous, fearsome insect. Rather is it being regarded merely as one of the common, though evil looking, bugs. In the writer's garden at Hartsdale a good crop of mantids had matured early in September. Many were observed stalking and capturing crickets and grasshoppers over low ground. Others had selected fixed stations on the stalks and branches of flowering plants and shrubs, where visiting insects fell easy victims, and where they remained until the blossoms dropped off, about 10 to 14 days. No discrimination, whatsoever, was shown in the selection of their prey. Flies, bees and wasps, butterflies, all were seized with utter disregard as to defensive weapons or unpalatable qualities. A favorite abode for several of the mantids was on a butterfly bush (*Budleya*) in a sheltered corner of the garden. The principal make-up of their varied menu is indicated, even now, October 12, by the wings of butterflies scattered on the ground below. These include *Pieris*, *Colias*, *Papilio*, *Grapta*, *Basilarchia* and, most numerous, the milkweed butterfly, *Danaus archippus*. Unpalatability evidently is not recognized by the mantis, although in some instances the abdominal parts, still attached to the secondary wings, have been rejected.

Panther, the neighbors' friendly cat, loves to toy with the mantids. They try to escape by running, jumping and short flights, but finally, when cornered, they show their pugnacious nature. Rearing up they assume a defensive attitude, the spurred, grasping legs held in readiness. The cat dislikes to be pricked on the nose and so usually confines itself to gentle pawing, without real injury to the insect. It is most amusing to watch.

In color the mantids run from bright green to slaty gray. The first egg mass was noted for October 2. To-day, October 12, a pair were seen in copula on the rose ramblers.

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METHODS AND TECHNIQUE FOR THE COLLECTOR.

Points for Mounting Small Insects.—Most directions for making points for mounting small insects are very elaborate. Nearly all call for an assortment of punches for the most fancy shaped points; and in assorted sizes, too. Also, the material is carefully specified—bristol-board, celluloid, mica, isinglass. In general, the easiest way of doing things is generally the simplest and best. The material for points is not so important as whether or not it will stay without curling up or drooping down; and whether or not it is stiff enough to hold up the usually small insects mounted on points. Perhaps the best material is the thickest ledger paper or cold-rolled heavy drawing paper. These are both linen, fibrous and stiff, but easily pinned and fastholding. A sheet of either (about 24×36 inches) will cut into thousands of points.

Cutting the points also is simple; all you do is to cut a strip of paper as wide as the length you want your points. With a pair of sharp scissors (and a little practice) it is possible to cut points of any width or pointedness you require. A strip of paper $1/3$ inch (about 8 mm.) wide and 4 inches (100 mm.) long will yield about 150 points in a few minutes.—J. R. T.-B.

Glue for Mounting on Points.—In my work I use a glue made out of the best granulated cooking gelatine dissolved in *glacial acetic acid*, to be purchased for a few cents at any drug store. Put about one ounce of this in a wide-mouthed glass jar (small, about 2-ounce size) with a bell cap—not a stopper; this can be secured from any dealer in entomological supplies. Add about half as much quantity of the gelatine (to be bought at any grocer's), stirring it about for a while until it is well mixed. It will be full of air bubbles and undissolved grains of gelatine, but pay no attention to this. Let it stand in a warm place overnight; and the next day it will be quite clear and free from bubbles. If it is too thick, add a few drops of acetic acid and let it stand again; if too thin, put in a little more gelatine—but not much. Stir it after adding the one or the other and let it stand again. Bear in mind that glue of the right thickness in winter will be too liquid in summer, and *vice versa*.

To put the glue on a point, use a glass rod drawn to a point and short enough to fit into the jar when the lid is on. A glass pen, to be bought at any stationery store, is excellent for this purpose.

Glacial acetic acid absorbs water from the atmosphere, which tends to thin the glue; and it also evaporates, according to conditions. To prevent this, grease the bottom of the bell cover with petroleum jelly (vaseline) and it will form a tight seal where the edge of the cover sits on the shoulder of the jar.

This glue sets quickly, but it does not glaze over nor soften in time, as shellac does. It will hold such things as slippery water-beetles.—J. R. T.-B.

Locality Labels.

The smaller the locality label, the better—so long as it is legible and has enough room on it to write in clearly the date or any other data needed. Of course, where labels are prepared for any specified catch, it is possible to print all data on them at one time. But where labels are for a given locality, to be used over long periods of time, this cannot be done. One point without which the modern locality label is incomplete is the collector's name, which should always appear as an integral part of the data.

Printed labels are always the best and neatest. When they could be brought at 25 cents per 1000 it was possible to get them for a small lot of insects at a nominal cost; but now that they sell at \$1 per thousand, that makes quite a difference. Hence, labels for small lots are either hand-printed with a fine pen, or else typed and photographed. For large lots, a zinc plate is good, especially for repeat orders. In connection with photographing labels and making plates of them for future use, it should be stressed that the typing must be done with clean type and a good black permanent ribbon on good white paper, backed by a sheet of carbon with the black side to the back of the sheet being typed. This gives depth and clearness to the typing and ensures a good, distinct reproduction.

The size of type about best for labels is that known as 4-point. All labels should be set solid and printed on heavy linen paper, in strips in such form that one cut of the scissors will separate one label from another. All data written in should be in waterproof India ink, with a Gillott crowquill pen—preferably in print characters.

Dates are best indicated on a label by means of figures: *e.g.*—July 4, 1933, may be written vii. 4. 33; or, in the English fashion, 4. vii. 33.

J. R. DE LA TORRE-BUENO.

Send in Your Short Notes for this Page.

NOTES ON THE LARVAL FEEDING HABITS AND THE LIFE HISTORY OF *EUMERUS TUBERCULATUS* RONDANI.¹

BY CHARLES H. MARTIN, Division of Truck Crop and Garden Insects, Bureau of Entomology, U. S. Department of Agriculture.

INTRODUCTION

In 1929 investigations on the lesser bulb flies of the genus *Eumerus* were initiated at Babylon, N. Y., on Long Island.² Studies were especially directed toward the feeding habits of the larvae, for the purpose of determining whether they are primary pests or scavengers, but some notes on life history were also made.

Previous to 1928 it was generally considered that the lesser bulb fly was only one species. The work of Hodson, Cole, Latta, and others indicated that this group actually consisted of three species, *E. tuberculatus* Rondani, *E. strigatus* Fallén, and *E. narcissi* Smith. Only a few specimens of *E. strigatus* and none of *E. narcissi* were taken on Long Island,³ *E. tuberculatus* being by far the most common. Therefore, the investigations here were confined chiefly to this species. Although the data thus far obtained do not clear up the status of *E. tuberculatus*, it is believed that they do throw further light on the subject. This work was done during July, August, and September, 1929.

OVIPOSITION IN CAGES

In the first attempts to obtain eggs, several hundred flies were placed in each of several Riley cages about 36 inches high and 18 inches square and the cages were kept in the sun. The flies were fed daily with undiluted extracted honey. Bulbs that had been discarded at the packing sheds were placed in the cages and examined daily. The flies were never seen on the bulbs and no eggs were found.

¹ These investigations were conducted under the general direction of Dr. C. A. Weigel, with the assistance of Dorothy Martin, field assistant.

² Work along the same lines was already in progress in California and at Sumner, Wash.

³ The determinations of the several hundred *Eumerus* specimens used in this work are based on comparisons with material and furnished by Dr. F. R. Cole.

Flies confined in a stock cage 6 feet high and 5 feet square remained on the sides near or at the top, and never near the heavily infested and decaying bulbs covering the floor of the cage. Mating was observed, but no eggs were ever found in this cage.

When the flies failed to oviposit in the Riley and stock cages, they were placed in small cylindrical ones. These cages were of 16-mesh screen, 10 inches long and 5 inches in diameter, and closed at the ends with cloth sleeves. From 30 to 60 flies from a few hours to two days old were released in each cage. Every day the dead flies were removed and replaced by newly emerged ones. Only a small percentage of the flies laid eggs. These eggs, supplemented by some collected in the field, were used for the various studies.

Eggs found in the cages were laid singly or in clusters up to 40. They were usually out of sight either at the neck under the dead skin covering the bulbs or in the crevices in the cork tissue at the basal end. These observations are in agreement with those made by Broadbent.⁴ The few eggs found on completely decayed bulbs were usually on some dry spot; those laid upon very moist decayed tissue became discolored and eventually collapsed.

FIELD OBSERVATIONS ON OVIPOSITION

Field observations of egg laying made on Long Island confirmed those made by Hodson⁵ in England. As harvest time approaches, the drying leaves shrink and fold, leaving holes in the soil beside them. Also at this time cracks are formed by the drying of the soil, such crevices following the ridge of the bulb row, often exposing some of the basal portion of the leaf. Flies were frequently observed entering such holes, presumably in search of places in which to oviposit. Many *Eumerus* eggs were collected in the folds of the dried leaves or in the bits of soil that happened to cling to them. Most of the eggs were found 1 or 2 inches beneath the surface of the soil, although occasionally they were found upon the surface. This is in agreement with the foregoing observations in the cages, where the eggs were generally laid in dry or slightly moist places.

According to Wilcox,⁶ *E. strigatus* in Oregon deposits the ma-

⁴ Broadbent, B. M. 1925. Notes on the life history of the lesser bulb fly, *Eumerus strigatus* Fallén. Jour. Econ. Ent. 18: 141-143.

⁵ Hodson, W. E. H. 1927. The bionomics of the lesser bulb flies, *Eumerus strigatus* Fln., and *Eumerus tuberculatus* Rond., in southwest England. Bul. Ent. Res. 17:373-384, illus.

⁶ Wilcox, Joseph. 1926. The lesser bulb fly *Eumerus strigatus*

jority of its eggs about one-quarter inch beneath the soil. "Some eggs are deposited directly on the surface, while others have been found three inches deep in the ground * * *."

While watching for oviposition upon freshly dug bulbs in the field, the author observed a female of *E. tuberculatus* laying eggs in the soil. As soon as the fly settled on a clod, she extruded her ovipositor and began to search for suitable places in which to deposit eggs. After inserting and withdrawing the ovipositor from a number of tiny holes in the clod, she finally selected one and remained with her ovipositor thrust in the hole for about a minute. From the muscular contractions of the abdomen it was evident that eggs were being laid. Later examination disclosed 30 eggs side by side in the tiny soil pocket. The female then made examinations of another clod and laid three more eggs. Other females were observed to oviposit in the same manner. The clods in which the flies were laying eggs were several feet from the nearest bulb.

The behavior of the female usually ovipositing in the soil or on the leaves of the bulb rather than directly upon it, may explain why so few eggs were obtained under artificial conditions. These habits also suggest that the female makes no distinction as to location or condition of the bulb.

INCUBATION

Eggs produced under cage conditions and held for incubation were removed with a bit of bulb and placed in test-tubes, which were then stoppered with cotton. Eggs laid in the field were allowed to remain upon the leaves. Too dry conditions in the test-tube made it difficult for the larvae to escape from the egg and also caused them to desiccate rapidly after hatching. This was avoided by keeping the walls slightly moist; too much moisture increased the mortality at the time of hatching. The larvae were removed with a camel's-hair brush.

Although the data were gathered within a period of nine weeks, the temperature varied sufficiently to make it possible to measure its effect upon the length of the relatively short incubation period. The mean temperatures were calculated from hygrothermograph records by means of a planimeter and then the mean length of the

Fallén in Oregon. Jour. Econ. Ent. 19: 762-772. For these studies Wilcox states that he retained only the name, *E. strigatus*. Curran determined specimens for him as *E. strigatus* and *E. tuberculatus*. There is even a possibility of *E. narcissi* Smith being present in his complex of species, since this insect occurs on the Pacific slope as far north as Oregon.

incubation period was determined at the different temperatures. The numerical records⁷ are summarized as follows:

Forty-two eggs incubated at a mean temperature of 64.7° F.; mean length of stage 5.1 ± 0.20 days; standard deviation 1.9 days; minimum length of stage 2 days; maximum length of stage 9 days.

One hundred forty-four eggs incubated at a mean temperature of 67.4° F.; mean length of stage 4.4 ± 0.06 days; standard deviation 1.2 days; minimum length of stage 3 days; maximum length of stage 7 days.

One hundred eggs incubated at a mean temperature of 70.2° F.; mean length of stage 4.1 ± 0.07 days; standard deviation 1.1 days; minimum length of stage 2 days; maximum length of stage 8 days.

Twenty-two eggs incubated at a mean temperature of 72.1° F.; mean length of stage 4.0 ± 0.14 days; standard deviation 1.0 day; minimum length of stage 4 days; maximum length of stage 6 days.

The mean lengths of the egg periods have been plotted against the corresponding mean temperatures in Pl. II. The diameters of the circles in Pl. II vary in size in proportion to the square root of the number of cases. Of course, as one would expect at these temperatures, the curve shows that the length of the egg stage decreases with rise in temperature.

FEEDING HABITS OF THE LARVAE AND EFFECT ON MORTALITY

Since Hodson⁸ has already published field observations of larval habits which are in agreement with the notes from Long Island, excerpts are taken from his comments: Larvae "hatching from eggs laid on the soil make no attempt to burrow through it, but travel * * * towards the cavity surrounding the adjacent bulb-neck * * *. Eventually all * * * arrive * * * where the dried foliage meets the still living neck of the bulb * * * undoubtedly attracted by the presence of a certain amount of damp and rotting tissue at the actual point of union. Many larvae commence to feed * * * and gradually enlarge the rotted area * * *." He comments upon the manner of entrance into the base as follows: "Such a point of entry is occasionally available in form of a cavity left where a root has died away, or a split where an offset is breaking away from the main bulb. * * * entry may be made at any suitably damaged point in the bulb."

⁷ Sixty-four eggs, recorded as laid on August 27, hatched in two days at a mean temperature of 67.5° F. These data differed so widely from the remaining data that they are believed to have been entered incorrectly and accordingly are not included in the summary.

⁸ Hodson, W. E. H. *Loc. cit.*

In the studies on Long Island with dormant bulbs full-grown Eumerus larvae were always found in decayed tissue. This suggests the possibility that decayed tissue is necessary for the development of the larvae. Close observations in the laboratory of 335 newly hatched larvae caged upon bulbs under a number of different conditions give added weight to this opinion.

It should be remembered, however, that these observations were made on dormant bulbs, as the experiments were conducted in August and September. At this time of the year the bulbs are full of stored starch and very hard. No doubt the condition of the soil surrounding undug bulbs or of the growing bulbs before the tops die back would influence the results. For this reason no conclusions can be drawn as to how the larvae will act in the spring when on the growing bulbs.

Bone rings one-eighth inch thick and an inch in diameter (such as are used for fancy needlework) fastened to the bulb with paraffin made convenient cages for microscopic studies of the larval habits and of the condition of the bulb tissue. With a pair of hot tweezers the wax was spread evenly around the inside and outside of the ring where it touched the bulb. A cover glass fastened with paraffin served as a cover. The cage could be easily opened by pushing a needle between the glass and the bone ring. The outer dry skin covering the bulb was removed before setting the cage upon the epidermis. Two or three drops of water were placed daily in most cages to delay desiccation of the larvae. Dormant bulbs, mostly of the Emperor and King Alfred varieties, were used for food.

Experiment A

Fifty-seven larvae were sealed in three cages on spots of apparently healthy bulbs where the epidermis had been broken and the tissue bruised to a pulp. Twenty-six of the larvae died in 4 days, 12 in 5 days, and 15 in 13 days; 4 disappeared. The bruised tissue did not discolor or decay in any of the cages.

Experiment B

One hundred and nineteen larvae were placed in seven cages upon unbruised epidermis of healthy bulbs. They were placed on the sides, neck, and base of the bulbs, the base being cut so as to remove the tough cork and expose the tissue. They rasped the epidermis continually and shortly the injured cells were marked in block patterns by a light brown discoloration. Only the cells forming the outside surface of the bulb seemed to be injured, discoloration remaining confined to the rasped areas. Larvae placed in

the neck of the bulb crawled between the storage leaves. All the larvae in this set of experiments gradually desiccated and died. The fact that none entered the tissue indicates that these larvae were unable to break the tough epidermis of dormant bulbs with their mouth parts, and that the epidermis was probably not affected by salivary juices. Hodson has suggested that "Liquefaction [of the bulb] is apparently aided by strong salivary juices * * *."

Experiment C

Sixteen larvae were confined in a cage placed upon unbroken epidermis over an area of partly decayed and partly healthy tissue. Some particles of débris from a decayed bulb upon which the ring had previously been placed clung to it. The larvae immediately congregated upon the ring. They were moved a number of times to the epidermis, but each time they returned to feed upon the decayed particles. Most of the débris had been eaten by the fifth day, at which time the larvae attempted to enter the decayed tissue of the bulb. This area was sliced off after they had been on the epidermis a week. The larvae were able to develop in the soft, decayed portion, and eventually adults emerged.

Experiment D

(1) Twenty larvae were confined upon a flat area made by slicing off a piece of the bulb. The water placed daily in the cage did not seem to soften the tissue except in two spots. No decay or discoloration of the tissue appeared. The larvae moved restlessly back and forth between the bottom of the cage and the cover slip. They were able to scrape the tissue only in the softened spots to the depth of a millimeter. Sixteen larvae were unable to develop and died after being in the cage 16 days. At this time a similar flat area was made on a decayed bulb and the four remaining larvae were transferred to it. They grew from 1.25 to 8 mm. in length in 11 days. At this time the studies had to be discontinued.

(2) This experiment was similar to (1). Sixteen larvae attempted to feed upon a sliced-off area of a healthy bulb, but were not able to develop. They died in a week.

(3) About a half inch of the base of a healthy bulb was sliced off and a cage mounted upon the flat surface. The 17 larvae placed in this cage attempted to feed, but without success. They died in a week's time.

Experiment E

The larvae were confined upon the unbruised epidermis of bulbs in the advanced stages of decay, two on the side of one bulb and

four at the side of the base of another. In each case the dead, dry skin was removed. The larvae rasped the epidermis but were not able to break it. For a time the two on the side increased in size, but they did not appear healthy and they died before reaching maturity.

Experiment F

(1) Twenty-six larvae were caged upon healthy, bruised tissue. The bulbs for two cages were soaked 10 days, making the tissue much softer than normal for dormant bulbs. The larvae immediately began cutting channels, their efforts being confined between the epidermal walls of the storage leaves. The tissue cut from the bulb discolored and decayed several days after the larvae had been confined in the cage. As soon as decay appeared, the larvae began to develop rapidly.

When the larvae began to pupate, the two bulbs were opened. The only decayed tissue present in the two cages was that which had been cut off the bulb by the larvae. The surface of the hole which they had cut in the bulb was pitted and very uneven, and the hole was discolored only a few cells deep. The tissue beyond the discolored cells was unaffected by decay. The larvae had been able to cut healthy tissue, but apparently were not able to assimilate it until decay had appeared.

(2) The bulb used for the third cage was not soaked; however, the tissue began to decay shortly after 10 larvae had been placed upon it. Decay did not spread much beyond the feeding limits of the larvae. They reached the pupal stage.

Experiment G

Sixty-one larvae were confined in three cages upon the broken epidermis of decayed bulbs. They immediately burrowed into the tissue and began feeding. Several of the larvae pupated while the rest were in various stages of development, when the cages had to be abandoned.

Discussion of Results

The results of these experiments are shown in Pl. III. From these data it appears that *Eumerus tuberculatus* larvae are able to cut healthy bulb tissue only when they have a suitable entrance through the epidermis and when the tissue is soft, as it probably becomes under growing conditions. That there is a tendency for the larvae to develop as scavengers is shown by the following facts:

(1) When placed on healthy tissue the larvae did not begin to develop until it decayed; (2) when on decayed tissue they began to develop immediately; (3) mature larvae were always found in decayed bulbs.

The data of Hodson⁹ give an idea of the ability of this species to enter healthy bulbs in the soil. For example, in a series of three experiments he found that 19 out of 72 healthy bulbs were attacked while 41 out of 72 decayed bulbs were entered. Thus, slightly more than twice (2.1) as many larvae were able to enter diseased bulbs as were able to enter healthy bulbs.

The larvae in a number of cages were observed to rasp the wax, which was softer than bulb tissue. Each rasped spot was marked by a fine striation which could be seen with the microscope. The wax often became discolored with bits of carbon from the match used to melt it. After the larvae had fed on the discolored wax, their alimentary canals were clearly outlined by the carbon particles through the transparent walls of their bodies.

Shellac was painted over the paraffin of several cages. Water caused it to become quite soft. The larvae were observed rasping upon it rather than upon the firm bulb tissue.

LENGTH OF THE LARVAL PERIOD

The length of the larval period seems to depend, in part at least, upon whether the larvae begin feeding in healthy or in decayed tissue. Under the former conditions the mean developmental period of seventeen larvae was 27.4 ± 0.55 days at a mean temperature of 72.5° F. Thirty-six larvae reared at the same time in decayed tissue completed their development in 22.1 ± 0.25 days. The difference between the two groups is 5.3 ± 0.6 days.

THE PUPAL STAGE

The pupation habits of the flies on Long Island were about the same as described by Hodson¹⁰ and by Wilcox¹¹ for the complex of species he called *E. strigatus*. In the field the pupae were found in the soil near the surface in close proximity to the bulbs or between the bulb leaves.

The data upon the effect of temperature upon the pupal stage

⁹ Hodson, W. E. H. *Loc. cit.*

¹⁰ Hodson, W. E. H. *Loc. cit.*

¹¹ Wilcox, Joseph. *Loc. cit.*

were obtained in the same way as those of the egg stage and may be summarized as follows:

Twelve pupae developed at a mean temperature of 65.8° F.; mean length of stage 14 days.

Twelve pupae developed at a mean temperature of 65.8° F.; mean length of stage 12.9 ± 0.11 days; standard deviation 0.6 days; minimum length of stage 11 days; maximum length of stage 13 days.

Fifty-four pupae developed at a mean temperature of 69.0° F.; mean length of stage 11.9 ± 0.10 days; standard deviation 1.1 days; minimum length of stage 8 days; maximum length of stage 14 days.

One hundred forty pupae developed at a mean temperature of 70.3° F.; mean length of stage 11.0 ± 0.03 days; standard deviation 0.6 days; minimum length of stage 9 days; maximum length of stage 13 days.

These data are shown graphically in Pl. II. In this figure the steeper slope of the curve for the pupal stage seemingly indicates that temperature accelerates the development of the pupal stage more rapidly than the egg stage. If, however, instead of using the absolute lengths as dependent variables, the logarithms of the mean lengths of the egg and pupal periods are used, the relative effect of temperature upon development is clearly seen. The logarithm curves, which eliminated the effect of the dissimilar lengths of the stages, have nearly the same slopes, demonstrating that temperature had approximately the same effect upon the egg and pupal stages. The length of the pupal stage of the females was the same as that of the males.

EMERGENCE

Emergence took place between 8 a. m. and 12 m., the peak occurring between 9 and 10 a. m. A few stragglers appeared in the afternoon. Broadbent¹² states that the species she had usually emerged at night. She has explained to the author that "night" covered a period between 4.30 p. m. and 8 a. m. Her unpublished notes made at Washington, D. C., in 1926 show emergence beginning at 5 a. m. and continuing throughout the morning. The peak appears a little earlier than in the data taken at Long Island. This might be explained by differences of light intensity. At Washington, D. C., the pupae were held in an outdoor, screened cage where they were exposed to more intense light than the pupae on Long

¹² Broadbent, B. M. *Loc. cit.*

Island, which were held in a room where little direct sunlight entered.

At the time of Miss Broadbent's studies the taxonomic status of *E. strigatus* and *E. tuberculatus* had not been established. Since *E. tuberculatus* is the most common species, probably most of the flies she had were *E. tuberculatus*.

SUMMARY

Eumerus tuberculatus Rondani laid its eggs in the soil near the bulb or upon the leaves of the bulb just beneath the surface of the soil, usually in dry or slightly moist places.

Newly hatched larvae were not able to cut through the unbroken epidermis of either healthy or decayed bulbs. They were, however, able to enter dormant bulb tissue after it was soaked and broken. Decayed tissue seemed to be preferred by the larvae and is probably necessary for their development.

The developmental period for larvae in decayed tissue was 5.3 ± 0.6 days shorter than for larvae beginning their development in healthy tissue which later decayed. Apparently not much development took place until the bulb tissue began to decay.

Temperature had about the same effect upon the length of the egg and of the pupal stages. The length of the pupal period was the same for both sexes.

The peak of emergence appeared to be during the morning hours.

EXPLANATION OF PLATES.

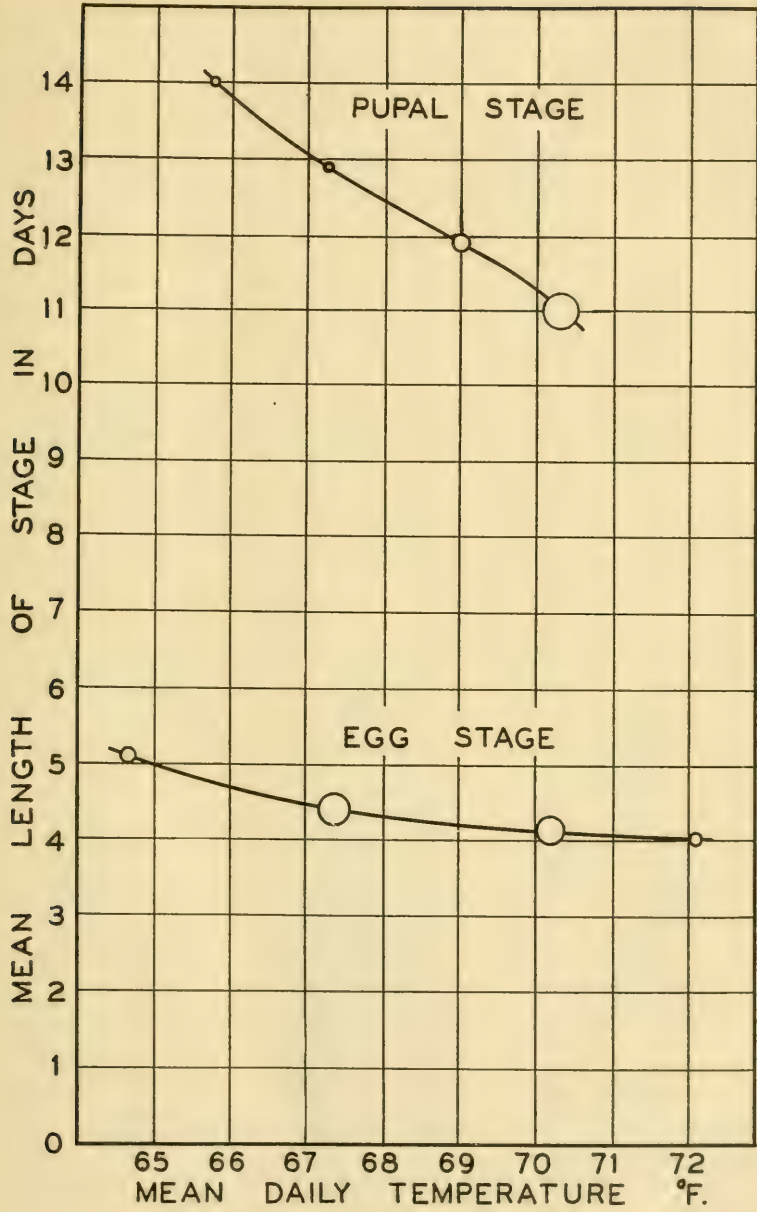
PL. II. The effect of temperature upon the length of the egg and pupal stages.

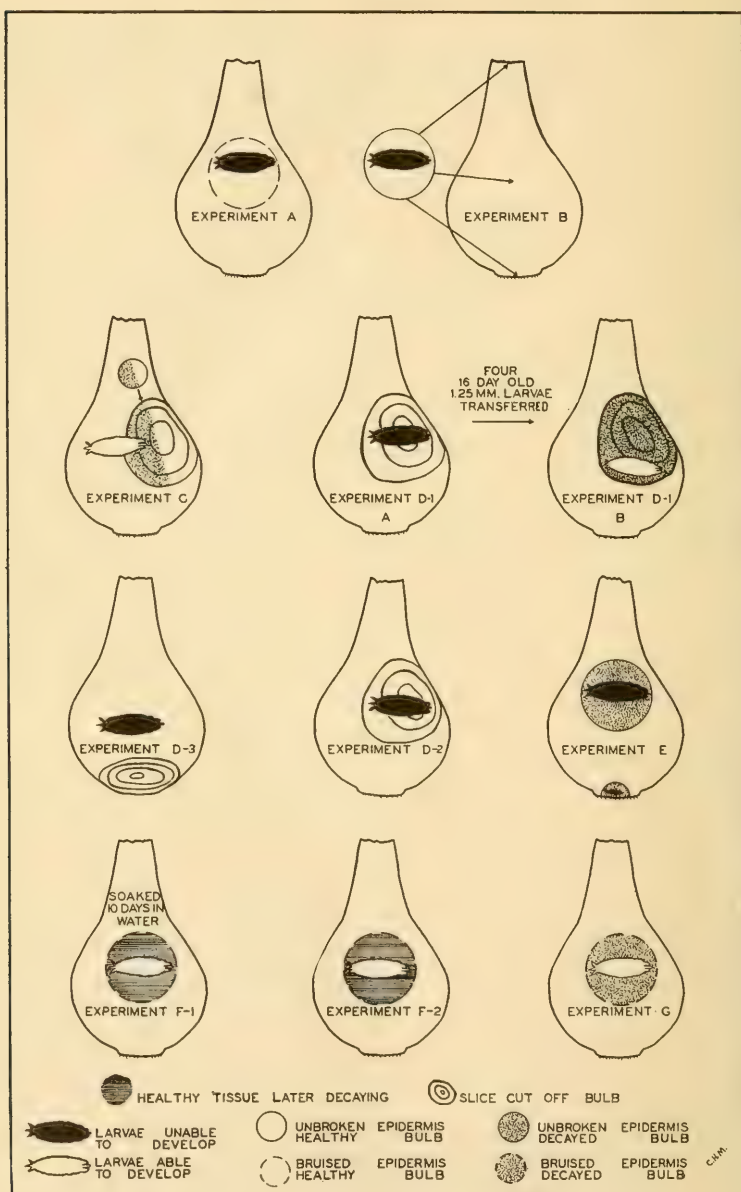
PL. III. Summary of the results of the larval feeding experiments.

Dorcus brevis Say in Alabama.—This rare, much disputed, but abundantly distinct species was first discovered in the State at Chicasaw, Mobile Co., in June, 1924, a female in the soil under an old *Magnolia grandiflora*.

Several years of hard work in the same locality failed to bring to light another specimen until June, 1929, when I took a male at sap on the base of an oak; friend Engelhardt was along that day, and he usually brings good luck as well as good cheer.

In May this year another male on the same tree and spot, and in June two more males were found under small rotten beech logs near lock 14 on the Warrior River, Tuscaloosa, Co.—H. P. LÖDING, Mobile, Ala.





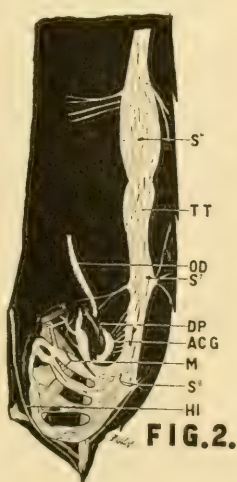
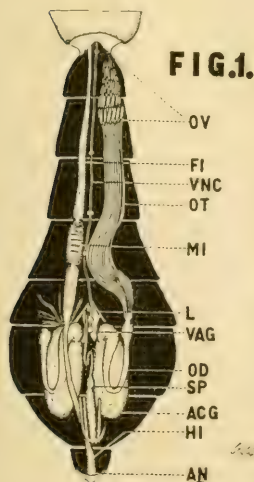
ANATOMICAL MODIFICATIONS ASSOCIATED WITH THE OVIPOSITION OF MEGARHYSSA LUNATOR.

CYRIL E. ABBOTT, Morgan Park, Ill.

Observing the oviposition of *Megarhyssa lunator*, one is startled by the apparent resiliency of her abdomen. As the latter is elevated, forming approximately a right angle with the thorax, the looped ovipositor lies within the intersegmental membranes, doubling the eighth segment and its associated structures back against the body. This at once suggests that the internal organs must be modified to withstand considerable stretching and torsion. It was with the object of verifying this conclusion that the following study was undertaken.

Specimens were fixed in Bouin's solution and preserved in 70 per cent. alcohol. Fresh material was used for study of the tracheal system. A binocular magnifier, giving a magnification of 40 diameters, was used.

The *ovarioles* (Fig. 1, OT), or individual tubes of the ovaries, extend from the thorax to the sixth segment of the abdomen. There are a considerable number of them. That portion of each ovariole that occupies the second and third segments is filled with elongate oval eggs in various stages of development (Fig. 1, OI'). Due to the fact that they are slightly longer than the portion of the body they occupy, the tubes are somewhat coiled. In the sixth seg-



ment the ovarioles of each ovary fuse, forming an oviduct (Fig. 1, *OD*). Just posterior to the point of fusion, the oviduct is bulbously expanded, forming the *egg calyx*. Near the posterior margin of the eighth segment each oviduct *doubles back*, and passing forward to the anterior margin of the same segment, again doubles back before entering a large sack, the *accessory gland* (Fig. 1, *AC, G*). Anteriorly the gland is continuous with the *vagina* (Fig. 1, *VAG*), a wide, thin-walled tube that opens to the exterior of the body between the lancets. Between the accessory glands, and very near the terminus of the abdomen, lies the *spermatheca* (Fig. 1, *SP*). Its posterior is continuous with several digitiform processes that are doubtless glandular. The body of the spermatheca is cylindrical and nearly transparent; anteriorly it continues as a slender tube communicating with the vagina. Its dark color indicates the presence of a chitinous intima. The vagina and the spermatheca are the only single reproductive organs; all the others are paired.

The organs described above have considerable *slack*, that is, they can be stretched considerably without danger of being ruptured. Even the tube of the spermatheca is slightly coiled.

The digestive and nervous systems, although they are not coiled, exhibit considerable slack. The midgut (Fig. 1, *MI*), which occupies the fifth and sixth segments, though heavy-walled, is much wrinkled; the remaining parts of the system are not only much wrinkled but thin and membranous.

The two terminal ganglia of the central nervous system (Fig. 1, *VNC*) lie close together upon the dorsal surface of the vagina. The fine fibers which connect them with the organs of that region, are, because of their tenuity, not easily broken.

The heavy musculature of the ovipositing mechanism requires a plentiful supply of oxygen, which is furnished by the heavy tracheation of this region (Fig. 2). The spiracles (*S*⁶, *S*⁷, *S*⁸) of this portion of the abdomen are all large; that of the eighth segment especially so. The figure shows the tracheation of the *right* side of the abdomen as viewed dorsally, with the ovipositing mechanism split and the right half tipped to the right to expose the ental surface. Actually that part of the tracheal trunk (Fig. 2, *TT*) lying between the large spiracle of the eighth segment and the drill plates is folded longitudinally with the bend directed ventrally between the wall of the abdomen and the outer wall of the drill plate. The larger tracheae are thin-walled, wrinkled, and slightly papillose. In a dissected specimen they are more or less collapsed, so that their appearance is flat rather than cylindrical.

Each spiracle is equipped with a closing apparatus, especially conspicuous in that of the eighth segment (Fig. 3). *OM* represents the muscle which opens, *CM*, that which closes, the spiracle.

In conclusion we may summarize the above observations by noting that in the female *Megarhyssa* abdominal modifications have taken place in two directions: (1) by the development of *slack* as illustrated, for instance, by the coiling of the reproductive ducts, and (2) enlargement of the tracheal system in response to the need of heavy musculature for oxygen. The peculiarities of the terminal segments of the abdomen of this insect illustrate the remarkable modifications that follow the extreme development of specialized structures.

ALMOST A CANNIBAL.

BY HUGH B. LEECH, Salmon Arm, B. C.

On May 12, 1932, a *Meloë montanus* Lec., fat and very much alive, was brought to me with a smaller beetle clinging tightly to the sutural edge of its right elytron. The little one proved to be *Pedilus monticola* (Horn); a few days later a second couple turned up, and on May 1st, 1933, another *Pedilus*-ridden *Meloë* was taken. Examination shows that in each of the three cases the elytra of the *Meloë* have actually been eaten away by the *Pedilus*. The 1933 specimen has lost the apical third and a smaller basal part of the left elytron, and some of the right; one of the 1932 examples shows a ragged edge from base to apex of the sutural margin of each elytron, and jaw marks breaking right through the integument all along the outer margins.

There is absolutely no doubt that the damage was done by the *Pedilus*, for in each case the offender was discovered in place, with jaws clenched in the host's wing case. Specimens of *P. monticola* Lec., are here most commonly found on flowers of the Black Hawthorn (*Crataegus brevispina* (Dougl.)), and their fall to the flesh-pots of beetle life must be rare, for of sixty-seven examples of *Meloë* before me, all collected at Salmon Arm, B. C., none but the three already mentioned shows the ragged gnawing feeding-marks of *Pedilus*.

EDITORIAL.**THE AMATEUR.**

On occasion we have pointed out the place—the important place—of the amateur in entomology. The foundations of the science were laid deep and sure by the amateurs, starting with Réaumur and even earlier.

The amateur is bound by no traditions save that of accomplishment; he has no preordained theories to demonstrate; he has no professional ties to condition his activities. In other words, he is a free man. His final results, therefore, depend solely on his will and on his capacity.

But in current phrase of high coinage, he is “the forgotten man” of our science. He has no home—our societies are becoming so highly professionalized that he gasps in their atmosphere like a trout out of water; or he is drowned in the carbon dioxide of esoteric science. His means of communication are cut. Our journals, on which he has relied to a certain extent, have become increasingly technical and dry. We give him good tough bones where he should have tenderloin steak suited to his milk-teeth.

And where do we leave the amateur now? In the hands of the insect speculators—the \$5000 butterfly men. His reading matter, if any, is now of the most popular and futile “transition form.” We all know just what “popular” science is, from Einstein right down the line. The general qualifications for writing the stuff that is far too often seen in print seem to be an extremely superficial knowledge of the subject, mated to a profuse flow of language the child of which is that perfectly sterile hybrid “popular science.”

Now, it behooves us one and all to forget our erudition and to consider the amateur, both in our publications of a general nature, and in the structure and conduct of our societies. J. R. T.-B.

A NEW LINE.

In this number of the BULLETIN we present a new department. It is going to be dedicated to collecting and preparing hints in short notes.

We have long felt that our publication, in common with others, was getting to be too highly technical and specialized. Thus, but little attention was being given to the beginner and the amateur, who, in the long run, are the experts of the future. They meet with problems long since solved, but nowhere do they find in concrete

form the answers to their queries. It is rather hard to find just what you are looking for in some general work. Or, if the information is given, it is in a general form and not specific. Or else, it fails to fit the particular problem.

Now, we will in this page, answer questions from our readers. Do not be bashful about asking them, no matter how elementary they may seem to be. If the questions are of sufficiently general interest, we will answer them here; if not, we will either answer them by letter or refer them to some one better informed in the subject.

We will also be glad to receive very short notes on technique for inclusion in this department; and suggestions for subjects that might be discussed in it. Longer articles, but in popular form, will also be welcome.

We will also be glad to answer queries about books or other printed sources of information.—J. R. DE LA TORRE-BUENO.

New and rare beetles on a sand beach.—In May, 1916, my friend Van Aller brought me two tenebrionids, which he had taken at light; they did not fit into any of the known North American genera and were submitted to Dr. Schwarz for an opinion.

Dr. Schwarz had no doubt it was an introduced species belonging to the genus *Leichenum* Blanch. and urged me by all means to find the habitat.

A random guess from their similarity to *Ammodonus* took us to the sand beaches of Mobile Bay, where ten hours' work finally was rewarded with one specimen, enough to warrant another try, this time equipped with collapsible bucket and by pouring water on the sand we had forty specimens in no time.

The species proved to be *Leichenum variegatum* Küst. and had no doubt been introduced in ballast unloaded in the river above and coming from Madagascar.

Incidentally these proceedings brought forth a number of other things, among them *Pseudephalus brevicornis*, later described by Casey, Mem. Col. xl, 1924, p. 333, and from the history of *Leichenum* there is room for suspicion that this may be another introduction; *Ulus maritimus* Csy. *Psammobius hydropicus* Horn, *P. cruentus* Harold and *P. schwarzi* Linell, *Mecynotarsus elegans* Lec., *Ammodonus fossor* var. *squamulatus* Chand. and *Meristhus cristatus* Horn, not to mention a severe case of sunburn.—H. P. LÖDING.

EXCHANGES

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

COLEOPTERA.—Am interested in exchanging Coleoptera. Carl G. Siepmann, R. F. D. No. 1, Box 92, Rahway, N. J.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa*, *macaria*, *mormonia*, *malcolmi*, *nokomis*; *Melitaea neumoegei*; *Lycaena speciosa*; etc. Send lists. Dr. John A. Comstock, Los Angeles Museum, Exposition Park, Los Angeles, Calif.

CATOPINI: *Catops* (*Choleva*), *Prionochaeta*, *Ptomaphagus*.—Wanted to borrow all possible specimens of these genera from North America for a revisional study. Correspondence solicited.—Melville H. Hatch, Dept. of Zoology, Univ. of Wash., Seattle, Wash.

HISTERIDAE.—Desire to obtain material, all localities, for identification, by purchase or exchange of other families. Chas. A. Ballou, Jr., 77 Beekman St., New York, N. Y.

LOCALITY LABELS.—60c per 1000, 5 in strip, 1 to 3 lines. 5 sizes type. 3½ point, 75c per 1000. Good heavy paper. Prompt service. A. L. Stevens, 691 Culver Rd., Rochester, N. Y.

I WILL COLLECT all orders of insects and allied groups for those interested. Louise Knobel, Hope, Ark.

BUY OR EXCHANGE: Pinned Microlepidoptera and papered Pieridae of North America. Full data with all specimens. Named material of all groups offered. Alexander B. Klots, College of the City of New York, New York City.

Vol. XXIX

APRIL, 1934

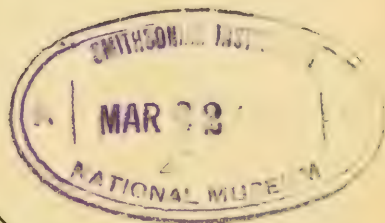
No. 2

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OF THE

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PUBLICATION COMMITTEE

J. R. de la TORRE-BUENO, Editor

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BULLETIN

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VOL. XXIX

APRIL, 1934

No. 2

NEW WEST INDIAN AND CENTRAL AMERICAN CHRYSOMELIDAE.

BY DORIS H. BLAKE, Bureau of Entomology, United States
Department of Agriculture.

The following notes have been made for the most part in connection with the determination of some Cuban Chrysomelidae sent me by Mr. S. C. Bruner, of Santiago de las Vegas. In addition four new Mexican and Central American species of *Galerucella* have been described which are related to *G. fuscomaculata* Jacoby and at least one of which was included by Jacoby in that species as originally described. The writer is indebted to K. G. Blair and G. E. Bryant, of the British Museum, for comparing type material.

Galerucella fuscomaculata Jacoby. Fig. 1, pl. IV.

Galerucella fuscomaculata Jacoby, *Biologia Centrali-Americana*, vol. 6, pt. 1, p. 491, 1886; vol. 6, Supplement, table 28, fig. 2.

Elongate oblong, about 4 mm. long, densely punctate and covered with short, thick, and closely appressed pubescence; dull pale brown with darker markings, often a spot on occiput, irregular darkening in lateral and median depressions on prothorax, and vitate sutural, median, and lateral elytral infuscations. Head densely but shallowly punctate over occiput, and covered with short pubescence; a deep, impressed, median, vertical line extending from occiput to interantennal area, a slight depression running from above antennal socket along inner side of eye, and between this and the median line a somewhat swollen boss on each side of upper vertex; pale brown, with region about median line on occiput frequently darker. Antennae short, not reaching much behind humeri, third joint longest, fourth and following joints of approximately equal length, gradually thickening; brownish. Prothorax scarcely twice as wide as long, with slightly arcuate sides and obliquely truncate basal angles; widely depressed on sides and with a shallow median

depression; surface densely and finely punctate and covered with short pubescence; dull yellow, usually with a darker median and lateral spots. Elytra oblong, with narrow lateral margin and prominent humeri; a basal callosity near scutellum; densely and more coarsely punctate than prothorax and covered with dense, closely appressed pubescence; dull yellow brown, with darker brown markings on humeri, an interrupted subsutural vitta widening in middle and toward apex, a median interrupted vitta, and a lateral darkening extending from humerus nearly to apex, these frequently evanescent in pale specimens. Body beneath shining under pale pubescence, more or less darkened, in dark specimens entirely dark; in pale specimens with metasternum somewhat darker; legs pale. Claws in female with shorter basal tooth than in male. Length 3.5 to 5 mm., width 1.6 to 2.3 mm.

Distribution: Mexico (Cerro de Plumas; figured specimen in British Museum, not examined by the writer); Guatemala (Champerico; Zapote; Cacao Trece Aguas, Alta Vera Paz); Nicaragua (Chinandega, Managua, San Marcos); Salvador (Acajutla); Canal Zone (Paraiso). (All these localities are represented by specimens in the National Museum, except Cerro de Plumas.)

Jacoby, in describing *G. fuscomaculata*, stated that he had specimens from Mexico to Panama which showed considerable variation in size and color. In the Biologia material in the United States National Museum labelled *G. fuscomaculata* there are two species, one from Zapote, Guatemala, the other from David, Chiriqui. K. G. Blair, of the British Museum, has compared the specimen from Cerro de Plumas figured by Jacoby in the Biologia with a specimen from Champerico, Guatemala, sent by the writer, and states that the one from Champerico and the Zapote specimen in the British Museum, presumably of the same lot as the Biologia specimen in the National Museum, agree with the specimen figured. He suggests that it would be better to consider the figured specimen the type rather than the one labelled *fuscomaculata* by Jacoby, which is from Rio Hondo, British Honduras, and which he thinks may be a different species.

Galerucella brevicollis, new species. Fig. 4, pl. IV.

Broadly oblong, about 4.5 mm. long with short, wide prothorax, and oblong elytra broadly rounded at apex; densely punctate and covered with short pubescence; dull pale brown, with darker markings in depressions on prothorax and interrupted subsutural, median, and lateral vittate elytral markings. Head densely punctate and pubescent over occiput, with a median depressed vertical

line extending to between antennal sockets; brown, sometimes with darker occipital infuscation. Antennae slender, extending to considerably behind humeri but not nearly to middle of elytra, third joint long; brown, with paler basal joints. Prothorax considerably more than twice as wide as long, with rounded sides and slightly obliquely truncate basal angles; lateral and median depressions; surface finely and densely punctate, and finely pubescent; pale brown, with lateral and sometimes median infuscation. Elytra broadly oblong, little depressed, with broad apex and narrow lateral margin; humeri prominent, with a short intrahumeral sulcus; surface densely and somewhat coarsely and deeply punctate, covered with short pubescence; pale brown, with darker brown subsutural, median, and lateral interrupted and not clearly defined vittae. Body beneath shining under the short, pale pubescence; brown, with darker shadings on metasternum; legs pale; claws toothed in both sexes. Length 4.3 to 5 mm.; width 2 to 2.5 mm.

Type, male, and one paratype, female, U. S. N. M. Cat. No. 44028. Other paratypes in the British Museum.

Type locality.—David, Chiriqui, Panama, collected by G. C. Champion.

Distribution.—Panama (David); Costa Rica (Piedras Negras); Nicaragua (Chinandega).

This is one of the two species in the Biologia material in the National Museum labelled *G. fuscomaculata* Jacoby. It differs from *G. fuscomaculata*, as here interpreted, by having a shorter and broader prothorax, wider and more deeply punctate elytra, and a quite differently shaped aedeagus. In its short, wide prothorax and broad elytra it resembles *G. marmorata* Jacoby rather than *G. fuscomaculata*, but it is a smaller and less densely pubescent species with different elytral markings and entirely differently shaped aedeagus.

Galerucella cyclopea, new species. Fig. 2, pl. IV.

Elongate oblong, about 4 mm. long, densely punctate, and finely and densely pubescent; head with a deep pit in middle of front; pale brown, with darker occipital spot, dark spots in lateral and median depressions on prothorax, and dark vittate subsutural, median, and lateral elytral markings. Head densely punctate and pubescent over occiput, with an impressed, median, vertical line; in middle of front above frontal tubercles a deep round hole; antennal sockets very close together; yellow brown, often with darker area along median line. Antennae brown, with paler basal joints, not extending much behind humeri; third joint longer than the succeeding ones, which gradually thicken. Prothorax not twice as wide as long, with rounded sides, obliquely truncate basal angles,

and wide lateral and median depressions; finely punctate and covered with short, appressed pubescence; pale brown, with darker lateral and median spots. Elytra oblong oval, with narrow lateral margin, well marked humeri, and intrahumeral sulcus; densely punctate and covered with dense pubescence; pale yellow brown, with darker subsutural infuscations and traces of median and lateral vittae. Body beneath shining under the fine, pale pubescence, brown, with darker metasternum; legs pale. Claws in male toothed. Female unknown. Length 4.2 mm., width 1.8 to 2 mm.

Type, male, and three paratypes, male, U. S. N. M. Cat. No. 44321.

Type locality.—Paraiso, Canal Zone, Panama, collected 27 April, 1911, by E. A. Schwarz.

Other localities.—Cacao Trece Aguas, Alta Vera Paz, Guatemala, collected by E. A. Schwarz and H. S. Barber.

This species, closely resembling *G. fuscomaculata*, and having a similar aedeagus, is slightly larger and has more closely placed antennae. It is at once distinguished from *G. fuscomaculata* and all related species by the striking pit in the front of the head.

Galerucella orthodera, new species. Fig. 3, pl. IV.

Elongate oblong, about 4 mm. long, head unusually broad, prothorax broad at apex and slightly constricted near base, with prominent nodule at basal angle; elytra with broadly rounded apex; densely punctate and pubescent; pale brown, with darker infuscations on occiput, in depressions in the middle and on either side of prothorax, and dark submarginal, median, and lateral vittate markings on elytra. Head broad, with antennal sockets widely separated; a median, impressed, vertical line from occiput to interantennal area, well defined tubercles, and a slight depression near inner side of eye; between this and the median depression a callosity on each side of vertex; densely punctate and pubescent over occiput. Antennae slender, not quite reaching back to middle of elytra, third joint longer than succeeding ones, which gradually thicken; brownish, with paler basal joints. Prothorax about twice as wide as long, broad at apex, constricted near base, with prominent nodule at basal angle; depressed on sides and in middle, densely punctate, and covered with short, appressed pubescence; darker markings in depressions. Elytra oblong, with narrow lateral margin, broadly rounded at apex and with prominent humeri and a callosity on each elytron near scutellum; densely punctate and densely pubescent; pale yellow brown, with darker subsutural, median, and lateral vittate markings. Body beneath shining under pale pubescence; brown, sometimes with metasternum darker;

claws in both sexes with short basal tooth. Length 3.5 to 4 mm., width 1.5 to 1.8 mm.

Type, male, and 3 paratypes, one male and two females, U. S. N. M. Cat. No. 44322.

Type locality.—Ancon, Canal Zone, Panama, collected 5 April, 1911, by E. A. Schwarz and A. H. Jennings.

This species is distinguished by its broad head, its long antennae, the basal sockets of which are widely separated, and by the fact that the prothorax is not narrowed apically but is constricted near the base. The aedeagus is quite unlike that of *G. fuscomaculata* or that of *G. cyclopea*.

Galerucella pauperata, new species. Fig. 5, pl. IV.

Slender, elongate oblong, about 4 mm. long, densely punctate and covered with short pubescence; pale yellow brown, with darker markings frequently on occiput and in lateral and median pronotal depressions, and traces of vittate subsutural, median, and lateral elytral infuscations. Head densely punctate and pubescent over occiput, with an impressed median vertical line and a depression running from above antennal sockets along inner side of eye; antennal sockets close together; head brownish, with darker area frequently along median line on occiput. Antennae extending considerably behind the humeri but not nearly to middle of elytra, third joint longer than succeeding ones, which are approximately of equal length and gradually thicken; brownish, with paler basal joints. Prothorax scarcely twice as wide as long, with arcuate sides and somewhat obliquely truncate basal angles; depressed on sides and in middle, densely punctate, and covered with short, closely appressed pubescence; pale brown, with darker infuscations in depressions. Elytra narrowly oblong, with a narrow lateral margin and well marked humeri; a basal callosity near scutellum; densely and distinctly punctate and covered with fine pubescence; pale yellow brown with traces of subsutural, median, and lateral darker vittae. Body beneath shining under pubescence; pale, usually with darker metasternum; legs pale; claws in both sexes toothed. Length 3 to 4.3 mm.; width 1.3 to 2 mm.

Type, male, with three paratypes, U. S. N. M. Cat. No. 44323.

Type locality.—Cordoba, Vera Cruz, Mexico, collected in April, 1908, by A. Fenyes.

This species is closely related to *G. fuscomaculata* Jacoby, but is more slender and elongate, and has a smaller prothorax and narrower head.

Galerucella oteroi, new species. Fig. 6, pl. IV.

Oblong oval, about 5.5 mm. long, not shining, densely punctate and pubescent, the prothorax short, the elytra elongate and consid-

erably wider than the prothorax; pale yellowish brown, with darker occipital spot, four black spots in a row across pronotum, elytra with dark grayish brown vittae, the paler and narrower intervening vittae being somewhat raised, and the two pale humeral vittae so closely placed as to be almost merged. Head densely punctate above, with short, closely appressed pubescence; an impressed median line down occiput to tubercles, the latter well defined; interantennal area flat, not produced, antennae well separated; region about median line and labrum dark. Antennae not quite reaching back to middle of elytra, first and third joints longer than remainder; first seven joints pale, with darker apex, the remainder entirely dark. Prothorax more than twice as wide as long, with rounded sides and small apical and basal nodules; deeply depressed on the sides and somewhat in the middle; surface densely and rugosely punctate, with short, fine, inconspicuous pubescence; pale brownish, with four black spots in a row slightly before the middle. Scutellum rounded at apex. Elytra elongate, with parallel sides, considerably broader than prothorax; humeri well developed; surface densely punctate, with short, fine, but dense, pubescence; the sutural edges and narrow pale vittae raised; a pale median vitta, two humeral vittae closely placed and at some points merged, the inner one beginning at base of elytra and ending at apical angle, the outer one beginning at humerus and at apex curving about to join the median vitta, a lateral vitta arising also at humerus and ending before apex, the lateral margin and apex also pale. Body beneath finely pubescent, pale, with darker shadings on metasternum and abdominal segments; legs pale, with dark anterior coxae and a dark median and an apical spot on femora and tibiae and darkened apices to tarsal joints. Length 5.2 to 5.8 mm., width 2.6 to 2.8 mm.

Type, male, and one paratype, female, U. S. N. M. Cat. No. 44324.

Type locality.—Buenos Aires, Trinidad Mts., Cuba, collected in May, 1932, by A. R. Otero, S. C. Bruner, and J. Acuña.

Galerucella oteroi is one of the largest of several closely related West Indian *Galerucellas*, and is distinguished by its four-spotted pronotum and pale-lined elytra with two nearly united pale humeral vittae. Two related species have been described from Cuba. *G. venustula* Suffrian is smaller, being not more than 4 mm. long, lacks pronotal spots, and has fewer elytral vittae. *G. maculipes* Blake is of approximately the same size, but has a more spotted pronotum, transverse elytral impressions, and wider pale vittae. The aedeagus is also different. Three related species of *Galerucella* have been described from Porto Rico. *G. obliterated* Olivier has fewer elytral vittae. *G. walcotti* Bryant and *G. varicornis* Weise

are smaller, are without pronotal spots, and have transverse elytral impressions and fewer vittae.

Disonycha laevigata Jacoby. Fig. 11, pl. IV.

Disonycha laevigata Jacoby,¹ described from the island of Grenada, British West Indies, and recently assuming economic importance in Porto Rico as a garden pest of beet and chard, is also represented in the National Museum collection from Jamaica (Chapelton, Spanishtown, Kingston), Haiti (Rio Froide, Bayeux), Dominican Republic (Macoris R., San Cristobal), Panama (Alhajuela, Ancon, Bohio, Chagres R., Corozal, Gamboa, Gatun, Juan Mina Plantation, La Sabanas, Panama City, Miraflores, Old Panama, Summit), and Costa Rica (Port Limon). In the Bowditch collection at the Museum of Comparative Zoology are specimens from Venezuela ("L. Laglaize") and Colombia (Puerto Colombia, Atlantico). Its occurrence in South and Central America, which has not been previously reported, has led the writer to suspect that this may be the species described by Harold² as *Disonycha eximia* from New Grenada (Calamar, Magdalena River, northern Colombia). From Harold's description, no distinction can be drawn between *D. laevigata* and *D. eximia*.

Argopistes coccinelloides (Suffrian). Fig. 8, pl. IV.

Argopus coccinelloides Suffrian, Archiv. f. Naturgesch., vol. 34, p. 223, 1868.

Sophraena coccinelloides Harold, Deutsch. Ent. Ztschr., vol. 21, p. 138, 1877.

A. R. Otero has recently reared at Santiago de las Vegas, Cuba, from larvae mining the leaves of *Forestiera rhamnifolia*, this second known American species of *Argopistes*. Suffrian's detailed description of *Argopus coccinelloides* entirely fits these Cuban specimens. In referring the species to the European and Asiatic genus *Argopus*, Suffrian stated that he was doubtful whether this beetle belonged to that genus. Harold, from Suffrian's description, referred the species to *Sophraena* (described by Baly,³ not by Clark, as stated by Harold). The species of *Sophraena* are more oval than those of *Argopistes*, and only moderately convex. G. E. Bryant, of the British Museum, to whom I have sent specimens of *A. coccinelloides*, states that "it is correctly placed in this genus (*Argopistes*), and has nothing to do with *Sophraena*." Baly⁴ in

¹ Jacoby, Trans. Ent. Soc. London, pt. 3, p. 262, 1897.

² Harold, Coleopt. Hefte, vol. 15, p. 6, 1876.

³ Baly, Trans. Ent. Soc. London, third series, vol. 2, pt. 4, p. 342, 1865.

⁴ Baly, Trans. Ent. Soc. London, p. 202, 1874.

1874 described a species of *Argopistes* from Japan which he named *Argopistes coccinelloides*. Suffrian's earlier use of the same specific name requires that Baly's species be given another name.

The Cuban species is closely related to *A. scyrtoides* Lec. (Fig. 7) of Florida, which has been recorded as a leaf miner of *Forestiera porulosa*.⁵ As in the Florida species, the coloring of *A. coccinelloides* is somewhat variable, but no specimens have been examined showing the red elytral spots typical of the Florida species. The apical joints of the antennae are dark, which is not true of the Florida species, and the aedeagus is slightly shorter, more slender, and with a somewhat differently shaped tip. Usually the elytra are reddish brown, with the apical half dark, and the head at the base and prothorax are dark. The antennae are yellow, the last three or four joints in the male, and the last one or two joints in the female, dark. The structure of the hind legs of the American species of *Argopistes* has not been adequately described (see figures). The legs are short and the femora are grooved on the inner side. The tibiae are about the same length as the tarsi, are shallowly grooved, and have a sheath-like prolongation; they are serrate on the inner side, end acutely, and enclose a broad but acutely pointed spur. This spur arises from the point where the tarsal joint originates, and projects slightly beyond the tibial sheath, making with the acutely pointed end of the sheath two points, from the outside resembling two spurs. The first joint of the anterior tarsi in the male is enlarged, and the first joint of the posterior tarsi is longer than in the anterior and middle pairs.

Mr. Otero made the following observations regarding the habits of the larvae of this species:

"Leaf miner on *Forestiera rhamnifolia* Gris., known locally as the 'Hueso blanco.' April 15: It was observed that the insect entered the leaf through the base, near the petiole. From this point it worked almost entirely around the border of the leaf, then turned backwards and continued the gallery in a direction more or less parallel to the first section. The larva is somewhat flattened, yellow or pale orange in color, with the head yellowish brown and the prothorax fuscous above; legs blackish. The plant was badly injured. April 25: Ten larvae emerged from the leaves placed under observation in the laboratory, and transformed to pupae, each constructing a small uncovered cell in the soil, just large enough to accommodate its body, where they remain until transformation takes place. (Larvae and pupae preserved in alcohol.)

⁵ Dyar, Proc. Ent. Soc. Wash., vol. 5, p. 137, 1905, and Blatchley, Florida Entomologist, vol. 8, p. 19, 1924.

May 5: Two adults emerged, and four more the following day. Adults were collected in the field while they were eating the leaves of the same host plant."

Bryant⁶ has described two species of *Argopistes* from South Africa that are leaf miners of olive trees. The only two American species whose food plants are known feed on species of *Forstiera*, a genus which also belongs to the family Oleaceae.

***Argopistes rubicundus*, new species.** Fig. 10, pl. IV.

Rounded, convex, shining, finely punctate, deep reddish brown above, the anterior and middle legs, posterior tarsi, and antennae slightly paler yellowish brown. Head withdrawn into the prothorax so as to be nearly hidden from above, eyes large, close together, vertex indistinctly punctate, a larger fovea on each side near eye, lower front somewhat retracted. Antennae at base closely placed, extending a little beyond humeri, third joint very short and slender, remainder slightly longer, of approximately equal length, and gradually thickening. Prothorax strongly convex, narrowed anteriorly and forming a half circle about head, lateral margin narrowly reflexed, basal margin sinuate over scutellum; shining, very finely and rather densely punctate. Scutellum small and triangular. Elytra strongly convex, with rounded sides, shining, finely and rather densely punctate. Body beneath with short prosternum and mesosternum, the anterior coxal cavities open; legs short; posterior femora much enlarged, tibiae shaped as in the preceding two species. Length 3 to 3.3 mm., width 2.5 to 3 mm.

Type, male, and three paratypes, one male, 2 females, U. S. N. M. Cat. No. 44792.

Type locality.—Cordoba, Vera Cruz, Mexico, collected in May, 1908, by Dr. A. Fenyes.

This species, the third of the genus known in this hemisphere, closely resembles the two species described in the preceding pages, but is different in coloring. The four specimens known are uniformly deep reddish brown without spots or other markings. The aedeagus, too, differs from those of the Florida and Cuban species.

***Stoiba marginata*, new species.** Fig. 9, pl. IV.

Rounded, not shining, about 6.5 mm. long, with convex, coarsely punctate elytra and a wide, explanate, lateral margin on both prothorax and elytra; head, antennae, lateral margin, apex and sometimes all but base of femora, the tibiae, and the tarsi pale reddish yellow; middle of pronotum, and elytra, except narrow margin,

⁶ Bryant, Bull. Entomol. Research, vol. 12, p. 474, 1922.

deep blue black; under-surface black. Head pale yellow, withdrawn into prothorax and nearly invisible from above; a median vertical line down occiput, tubercles swollen, antennal sockets closely placed; carina not produced but lower portion of front under the antennae swollen on each side. Antennae not extending below prothorax, pale yellow, with first four joints subglabrous, the rest pubescent; third joint long, fourth and fifth shorter and approximately of equal length, thicker than third, and the succeeding ones gradually thickening. Prothorax narrowed anteriorly, with slightly emarginate anterior margin and with sinuate basal margin; sides widely explanate and pale reddish yellow; median area slightly convex and dark blue black; alutaceous, coarsely, and in some places densely, punctate, with trace of a median line. Scutellum triangular, black, shining. Elytra strongly convex, lateral margin at more than right angles with declivity of convex median portion and widely explanate in basal half; surface coarsely and densely punctate, the punctation becoming even coarser on lateral margin; deep blue black in color with narrow reddish yellow lateral margin; wings vestigial. Body beneath shining black; apex of femora (in one specimen all of femora except base), the tibiae, and the tarsi pale; claws with short, broad basal tooth. Length 6 to 7 mm., width 6 to 6.5 mm.

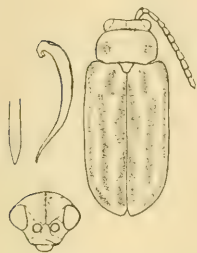
Type and one paratype, U. S. N. M. Cat. No. 44325.

Type locality.—Buenos Aires, elevation 2,350 to 2,800 ft., Trinidad Mts., Cuba, collected 4 May, 1932, by S. C. Bruner and A. Otero.

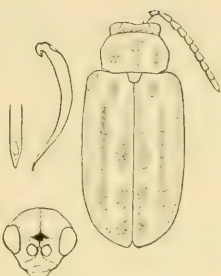
This species differs from related species of *Stoiba* with dark elytra in having a pale lateral margin and in being coarsely punctate. The elytral punctation is not so coarse as in the extremely coarsely punctate species of *Elytrogonia*, but is coarser than in *S. decemmaculata* Blake. As in *S. decemmaculata* and *S. bruneri* Blake, the wings are vestigial. The antennae resemble those of *S. flavicollis* Klug and *S. indivisa* Blake in having the fifth antennal joint short, pubescent, and like the succeeding ones.

Stoiba fascicollis, new species. Fig. 12, pl. IV.

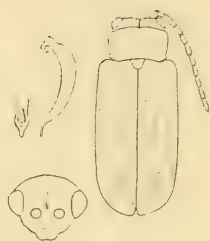
Rounded oval, about 8 mm. long, with explanate margin on both prothorax and elytra; not shining, alutaceous, distinctly punctate; elytra strongly convex; antennae, margin of prothorax, and legs, except at base, yellow; prothorax banded; elytra deep blue black, undersurface black. Head pale yellow, withdrawn into prothorax and barely visible from above; a median vertical line down occiput; frontal tubercles well marked, alutaceous, and punctate; antennal sockets closely placed. Antennae not reaching much beyond pro-



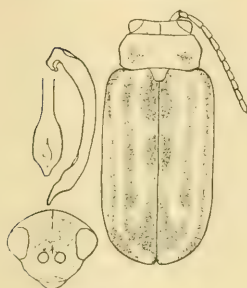
1 *Galerucella fuscomaculata*



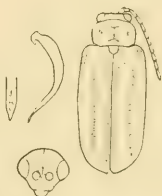
2 *G. cyclopea*



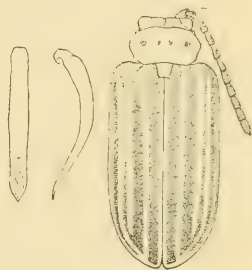
3 *G. orthodera*



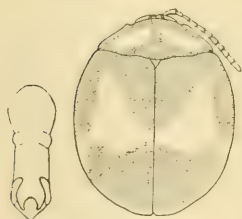
4 *G. brevicollis*



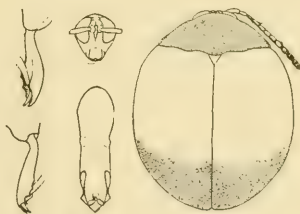
5 *G. pauperata*



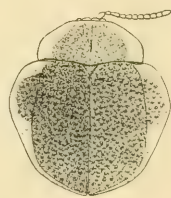
6 *G. oteroi*



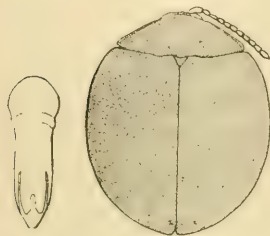
7 *Argopistes scyrtoides*



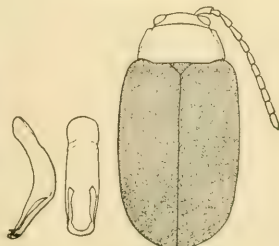
8 *A. coccinelloides*



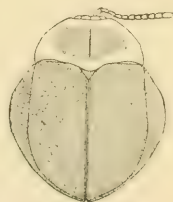
9 *Stoiba marginata*



10 *Argopistes rubicundus*



11 *Disonycha laevigata*



12 *Stoiba fascicollis*

notum, pale yellow; first four joints subglabrous, third joint a little longer than fourth, fifth and remaining joints pubescent and gradually thickening. Prothorax narrowed anteriorly, with slightly emarginate anterior margin and sinuate basal margin; sides widely explanate; disc slightly convex and with wide dark band; surface alutaceous and with scattered coarse punctures and median line. Scutellum dark and shining. Elytra strongly convex, with margin spreading at an obtuse angle from declivity of convex median portion, and wider in basal half; distinctly punctate and alutaceous; blue black; wings fully developed. Body beneath shining black; legs, except at base, pale; claws with a short, broad basal tooth. Length 7.5 to 8.5 mm., width 6 to 6.8 mm.

Type, male, and one paratype, U. S. N. M. Cat. No. 44326.

Type locality.—Buenos Aires, elevation 2,350 to 2,800 ft., Trinidad Mts., Cuba, collected 4 May, 1932, by S. C. Bruner and A. Otero.

This appears to be a distinct species rather than a dark variety of *S. flavicollis* Klug, since the elytral punctuation is a little denser and more distinct than in any form of that species, and the aedeagus is slightly wider. There are undoubtedly several forms or species confused under the name *S. flavicollis*, but no form has been described having a band across the pronotum.

A Change of Name in the Genus *Rhagovelia* (Hemiptera, Veliidae).—In a recent paper on the genus *Rhagovelia* (Annals Ent. Soc. Amer., Vol. 26, pp. 467-468, Sept., 1933), I described a new species from Perú, South America, under the name *Rhagovelia hungerfordi*. Since this article appeared, it has been called to my attention that Lundblad previously used *hungerfordi* for a variety of *Rhagovelia femorata* Dover from the East Indies region (Sonder-Abdruck aus dem Archiv für Hydrobiologie 1933. Suppl.-Bd. XII. Tropische Binnengewässer IV Seite 1-194, pp. 293-295, fig. 88). I therefore propose the new name *Rhagovelia abrupta* to replace *R. hungerfordi* Gould, 1933 (not of Lundblad, 1933).—GEORGE E. GOULD, Purdue University Agricultural Experiment Station, Lafayette, Indiana.

An unusually early hatch.—While duck hunting on the Gila River about fifteen miles below the Coolidge Dam, on January 15, 1934, I noticed an unusually early and heavy hatch of *Libythea backmani* (Lepidoptera-Rhopalocera). This insect usually hatches from hackberry but there is no hackberry in this locality.—D. K. DUNCAN, Globe, Arizona.

BIOLOGICAL EXPLORATIONS IN THE NORTH AND SOUTH WEST.*

BY GEORGE P. ENGELHARDT, Hartsdale, N. Y.

Field investigations during the past season were conducted principally in the arid regions of eastern Oregon and Washington and in southern and eastern Utah. Agents of the U. S. Bureau of Entomology and friends from respective State Colleges, by pre-arrangement acted as companions and guides. As usual, with my special interest, the Aegeriidae or clear-wing moths, uppermost in mind, there were obtained some 200 specimens of this family comprising 25 species, including several undescribed.

Crossing the continent by rail, with stop-overs at Mobile, San Antonio, Tucson, Los Angeles, and San Francisco, serious collecting was not attempted until I joined B. G. Thompson of the Oregon State College at Corvallis and we started on the morning of June 25 with John Davis, High School Principal, and Kwan Lun Wong, Graduate Student, for the Steen Mountains. Mr. Thompson's reputation as an accomplished archer is attested by trophies of bear, mountain lion and deer; Mr. Davis proved himself an expert at the wheel and Mr. Wong earned our gratitude by his skill in the culinary arts.

We travelled by a way of Eugene, Grant's Pass, Medford to Klamath Lake, a famous breeding place for aquatic birds, so beautifully commemorated in a habitat group at the American Museum of Natural History. In spite of much draining and fast growing industrial developments, bird life is still abundant, particularly the white pelicans. On the second day, passing through rough country of volcanic formation, sage brush plains and forests of yellow pine, we reached Lakeview in time for an afternoon's detour to mosquito-infested Lake Albert and the straggling little town of Paisley, where a big, iron-barred cage was explained to us as constituting the jail. Returning to Lakeview, we left the highway, continuing over deeply rutted, high centered dirt roads through bleak, barren country with hardly any human habitations to Berkley. This is a veritable ghost town of a once prosperous colony of dry wheat farmers, ruined after a succession of years of drought. The high spots of the day were fine tiger beetles and Cicadas collected along the shores of dry lakes, and the number of pronghorn antelopes roaming the hills, singly, in pairs, and in herds of a dozen or more. Natives volunteered the information that the pronghorns in eastern Oregon from near estimation have increased to 2000 or even

* Abstract of an address delivered at the Brooklyn Entomological Society, February 15, 1934.

10,000. The first estimate may be accepted as conservative. Our last run for the day took us over fifty miles of execrable, washed-out roads to the Donner and Blitzen River, where we found shelter in a fisherman's camp. The river, a formidable, turbulent stream, abounding in trout, attracts followers of Isaac Walton from far and near. The fish were jumping constantly for stone- and may-flies hovering in myriads over the water. The Steen Mountains, close at hand, but under a deep mantle of snow, proved inaccessible. However, collecting in the river canyon was fine.

With the exhaust pipe smashed and the engine coughing, we barely managed to get back to a passable road leading to Malheur Lake, another famous bird refuge, now mostly drained and converted into pasture lands. Ducks, divers and gulls still populate the marshes and open spaces and sandhill cranes stand guard along the ditches. Temporary repairs to the car were made at Burns, a typical cowboy town, still breathing the air of the wild and woolly West. In the wake of a rodeo, pool parlors, dance halls and eating places were crowded with cowboys, girls and Indians.

Good collecting again was found in the forest reservations at Silvies and Seneca on the way to the old mining camps of Canyon City and John Day. Neither of these places has undergone many changes since the gold rush of the early days, though of late there is renewed activity in rewashing the old dumps and about the prospecting holes which perforate the hillsides. Here we learned of a huge fossil turtle, weighing at least two tons, exposed on the fossil bearing blue cliffs, some miles down in the canyon of the John Day River. Detouring, we found the location, real blue rocks of crumbly, hardened clay, eroded into all sorts of fantastic shapes, but nothing resembling a turtle. The rocks, dissolved in water, might well serve as a substitute for bluing.

At Primeville and at Bend on the Deschutes River, we found much material of interest, well-nigh filling our specimen containers. The sixth and last day took us over the McKenzie Pass, ascended through miles and miles of black, forbidding lava beds, through narrow lanes of snow twenty feet high on the divide and on the descent of the western slope through splendid forests of Douglas spruce and cedars. What contrasts may be encountered in a day's travel in the West! Bleak, barren country in the morning, snow covered mountains at noon and vast, shady forests and verdure clad valleys before sunset.

This experience was repeated on subsequent trips in company with Dr. Melville H. Hatch of the University of Washington at Seattle, and with Mr. Joseph Wilcox, specialist on robber flies, and Mr. S. E. Crumb, authority on cut worms, both U. S. agents

at the Experiment Station at Puyallup. On these excursions, the Cascade Mountains were crossed over Snoqualmie Pass to Cle Elum, Ellensburg and Yakima, the latter a striking example of what can be accomplished by irrigation in transforming a barren country into one of the finest orchard regions of the world. New life histories of clear wing moths and captures of many other insects rewarded our efforts at White Swan, near Yakima, and also on our return over Naches Pass. There was no collecting above timber line in the Cascade Mountains during the season of 1933. On a visit to Sunrise Park on July 5 and to Paradise Park a few days later only the gables of cabins peaked through the snow.

At Pullman, Washington, I was met by J. F. Gates Clarke of the Department of Zoology at the State College. An enthusiastic and indefatigable collector, we roamed his country hither and yon, discovering species never collected before. We explored the Snake River Canyon, crossed the state line into Idaho and followed tortuous gullies among rounded hills, bearing heavy crops of grain. Hardly any of the former prairie vegetation has escaped the plow. Only a small patch of original prairie land is being kept intact near the State College at Pullman.

Jim Baker, a young amateur collector from Baker, Oregon, having heard of my visit in Corvallis, had motored there, 300 miles each way, just on the chance of making my acquaintance, missing me by a few hours. Passing through Baker on the way to Utah, I stopped over. I shall always cherish the hearty welcome extended to me by Jim and his parents. We had three days of unexcelled collecting in the Blue Mountains. They are an entomologist's Paradise.

E. W. Davis, of the U. S. Bureau of Entomology, in charge of sugar-beet insects, was waiting for me in Salt Lake City, ready to start on one of his monthly inspection trips to southern Utah and Las Vegas, Nevada. We breakfasted in Salt Lake City and supped at Las Vegas, Nevada, on the same day. What a different experience from a first visit to Utah in 1904. In those days, travelling by covered wagon, it took a week to cover about half the distance!

Beet growers in Utah are subjected to great losses by a virus disease, known as curly-top, which stunts the growth of the beets. This disease is transmitted only through the agency of a small leafhopper, *Eutettix tenella*, also called "white fly." The disease cannot pass over the winter on the beets, nor in the soil. Remedial measures, therefore, depend entirely on control over the insect carriers, a difficult problem as the leafhoppers live on a variety of plants, but particularly the Russian thistle, *Salsola pestifer*. This weed has taken possession of the road sides, fields and waste places

in many of the Western states. With constant check-ups along the lines of the leafhopper distribution and their routes of migration, it has become possible to predict with surprising accuracy the extent of an outbreak of the disease in advance of the growing season, thereby guiding the farmer at the time of planting. This may be accepted as an example of the many ways in which the U. S. Bureau of Entomology is rendering services of incalculable value to the farmer. Contact with agents in charge of such work proved them to be well fitted, mentally and physically, to carry out their arduous tasks. On trips through rough, unbroken country no better companions could be found.

Utah, among all the states, it must be conceded, stands preeminent as regards diversity and grandeur of scenery. Splendid highways are fast giving speedy access to colorful canyons, natural bridges and surprising monuments, hitherto hidden in mountains and deserts.

Returning from an inspection of Boulder Dam on the afternoon of July 25, Main Street in Las Vegas registered 110° in the shade. Our air-cooled rooms in the hotel registered 75° . What a relief! Sunrise the next morning found us well along the road leading to St. George and Zion Canyon, Utah. There were many opportunities for good collecting while Mr. Davis checked up on his leafhopper work. Our round trip of 1200 miles ended at Salt Lake City on July 27.

Excursions to Ogden, the State College at Logan, and the Wasatch Mountains, included a three days' visit to the University Camp at Timpanogus, a wonderful mountain, elevation 11,000 feet, set apart as a forest reservation. How my host and guide, Dr. Vasco Tanner, of Brigham Young University, enjoyed the pristine beauty of the Alpine meadows of this mountain. Overgrazing has obliterated so much of the native flora of the West, it is a satisfaction to note that there are some places which have survived.

The last chapter of this narrative deals with the eastern part of Utah, a region as yet almost devoid of railroads and highways, and consequently a closed book to the travelling public. It is a country of vast deserts and bad lands, abounding in curious rock formations and treacherous streams. One's impressions alternate about equally between thrills and frights.

On August 2, Mr. Davis swapped passengers at Richfield, Utah, he taking on Dr. White from the home office in Washington, and I joining Mr. W. A. Shands, from Grand Junction, Colorado, a field agent also engaged on the leafhopper work. Our first run was to Bryce Canyon and the hot dusty settlement of Escalante in the desert below. Navajo Mountain loomed in the distance as a land-

mark. Chasing tiger beetles at Otter Creek Reservoir, we got badly mired on the boggy shore. In camp at Fish Lake, a popular mountain resort, elevation 9,000 feet, we found hoar frost in the morning, but it thawed out quickly on descending to the town of Loa, where we filled our tank and extra containers with gasoline in preparation for the long run to Hanksville on the Dirty Devil River.

At Torrey we entered the narrow canyon of the Fremont River, known as "Capitol Wash" for the singularly dome shaped cliffs crowning the top. This canyon, five miles long, is the only drainage outlet for many miles. In the season of summer showers and cloudbursts it must be traversed with caution. If caught in the on-rushing water, between the perpendicular walls, there is no escape for car or man. Blackening clouds were adding to our feeling of uneasiness. We were constantly on the alert to catch the roar of water that would warn of danger from behind. Dodging around boulders, crossing and re-crossing the stream, it took two hours to get through to expanding valleys, deeply filled with soft alluvial soil. The streams here have cut channels twenty to fifty feet deep, ever changing their course after heavy rains. Often we had to resort to shovels to effect a crossing. The Russian thistle thrives along the streams and on the flats, hence they are favorite breeding places for the leafhoppers and we made numerous detours to check up on their prevalence and development. At Hanksville, where we replenished with gas, the natives were at work repairing the damage of a disastrous flood. The town lies near the junction of the Dirty Devil and the Muddy Rivers, the latter compelling a crossing always dangerous because of quicksand. Unknown numbers of horses, cattle, wagons and men have disappeared in it without leaving a trace. Only the previous week an auto, stuck in the sand, had sunk in to its very top by the following day.

The stream bed is wide and harmless looking, with just a trickle of water here and there. It must be crossed in a sudden dash with never a stop, lest the sand takes hold on the wheels, when there is no escape. As an additional precaution, we blew our horn, which brought on a team of horses from a neighboring farm. With these harnessed to the front of the car, we simply galloped across.

Next came a stretch, a hundred miles or more, of open, waterless desert. No cars passed us on the single track, deeply rutted, sandy road. This desert is a stronghold for wild horses. We saw moving objects at a distance too far to make them out. At intervals these horses are subjected to round-ups, usually ending in a corral at one of the few water holes. They are now attempting round-ups with airplanes, unsuccessful so far. The wild horses,

contrary to reports and to the movies, are in fact a rather poor, degenerated lot, unfit for practical uses. Their only value lies in the hides, and in the meat, when converted into chicken feed, dog biscuit and such.

At Greenriver, we returned to a well surfaced highway and continued in comfort to Moab on the Colorado River, to Monticello in the Abajo Mountains and through the town of Blanding to an escarpment affording a magnificent view over the Valley of Monuments to the San Juan River. This is the country of natural bridges. There are many of them, some passed on the highway. All are of the same formation in red or white sandstone. The differences are only in size.

Deserts in midsummer are poor places for collecting. Occasionally one does capture a prize. This happened at Moab below a red sandstone cliff. On low growing, stiff leaved shrubs, we found three caterpillars which might well turn out to be *Sphinx elsa*, one of the rarest of North American hawk moths, of which only a few have been collected in many years. Of the three caterpillars only one gave a strong healthy pupa. Its true identity will not be revealed until emergence time next summer.

Most promising of the mountain ranges in eastern Utah, appear to be the La Sal Mountains, easily accessible from Moab. They are an isolated unit in the desert, are heavily wooded, and have peaks well above 12,000 feet. Also they are a National Forest Reservation. They may be the objective on another occasion.

My field activities terminated at Grand Junction, Colo., on August 9th.

In retrospection, the season of 1933 stands out as one of the most successful in many years. Never have I been privileged to travel with more congenial and helpful companions.

For an old-time collector and nature lover it is difficult to refrain from picking up all sorts of insects, even if they fall outside of his special hobby. There is the joy of first acquaintance with many of the creatures in their native haunts; and then the satisfaction of passing them on to friends and deserving workers, eager for just such material. This is the disposition that will be made of a miscellaneous collection of some 3000 specimens including all Orders.

Over 1000 specimens of the Coleoptera were kindly mounted by Mr. Lionel Lacey, but only a few of these have thus far been determined. The specimens are still in the original lots, according to the localities in which they have been collected. This is of interest as illustrating the association of species in ecological environments. Sea shore, lake margins, forests, sage brush country, deserts and regions above timber line are represented—its varied make-up presents the appearance of a very fine lot of beetles; but judgment

must be deferred until they have been passed upon by experts. One species, however, should be mentioned because of the thrill its capture gave—it is *Desmocerus piperi*, one of the elderberry Cerambycids recorded only from the Blue Mountains in Eastern Oregon. The brilliant colors of the living beetle surely evoke admiration—the males with rich scarlet elytra and the females steel blue with red margins. Unfortunately the brilliance of these colors is much dimmed in the dead and mounted specimens.

In the Eastern States there has been noted a progressive scarcity, as yet unexplained, in comparison with former abundance, of some of the common butterflies, such as *Papilios*, *Argynnis*, *Vanessas*, etc. In the West also there have been drastic changes, due to overgrazing, timber operations and forest fires. This has brought about the establishment of many forest and forage reservations, under government control, followed by a gratifying recovery of the flora and fauna. Such reservations are the best collecting places of today. Insects are again as abundant in some places as ever they could have been. Productive collecting generally can be expected in protected mountain valleys along water courses. The Blue Mountains of Eastern Oregon are an example. The abundance of butterflies there is amazing. *Basilarchia lorquini* and *Aglais californica* can be caught by the hundred. Fairly common also was *Papilio indra*, one of the rarest of North American swallowtails. In the Cascade Mountains of Oregon and Washington this butterfly appeared to be replaced by *Papilio salicaon* and in the Wasatch Mountains of Utah by *P. bairdi*. The swallowtails *rutulus*, *daunus* and *eurymedon* were rather frequent in many of the regions visited; and there were abundant *Parnassius*, *clodius* on the western and *smintheus* on the eastern slopes of the Cascade Mountains.

Thecla bairdi was encountered in numbers in open fields at the eastern end of Snoqualmie Pass, Wash., visiting the flowers of *Sedum spathulifolium* and *Eriogonum umbellatum*. On these flowers we discovered also its larvae, blending in with the blossoms. Holland states that the food plant of this species is not known, but it seems doubtful that the observation should have escaped Dr. Comstock and other keen students on the Pacific Coast.

Mount Timpanogas at Provo, Utah, proved another delightful experience in the beauty of its setting and the splendid collecting in all orders. At the foot of the glacier we caught *Argynnis leto*, both sexes; and higher up on the Alpine meadows, lots of *Argynnis clio* and *Melitaea neumogeni*, so named provisionally by comparison with illustrations in Holland's Butterfly Book. A small blue, closely resembling *Lycaena aquilo* from Labrador, was found only along the upper edges of the meadows at an elevation of 1000 ft.

Brigham Young University of Provo supports a biological station consisting of several small frame buildings in a grove of willows near the shore of Utah Lake. On our visit we were startled by swarms of the underwing moth *Catocala sirene*, which flew out from under the eaves. They suggested bats leaving their roosts in caves at dusk.

At this time I must forego mentioning many more species of Lepidoptera as well as the extensive collections of Hymenoptera, Diptera, Hemiptera and other Orders.

A Correction: Just too late for change two errors were discovered in the Noctuid list included in Dr. Klots's "New Records of Lepidoptera from New York" (Bull. Brook. Ent. Soc. XXVIII: 209-210. Dec., 1933). The first was my error, the second not. P. 209, "*Hormisa orciferalis* Wlk. Resort, 23 July, '31." A recheck of structural characters removes this from the genus *Hormisa* entirely; I hesitate to try a second name on this somewhat imperfect specimen. P. 210, "*Chlorizagrotis thanatologia* Dyar. Morton, 18 July" has been redetermined by Dr. McDunnough as *Euxoa pleuritica* Grt. This specimen is a female, and according to the state list otherwise known from N. Y. only by the type.—A. GLENN RICHARDS, JR., Rochester, N. Y.

Acmaeodera papagonis Duncan.—The original description of this species published in December, 1933, Bulletin of the Brooklyn Entomological Society, Vol. XXVIII—No. 5, on page 231, through oversight of the author neglected to state the locality of this species. This should be as follows: Baboquivari Mts., S. W. Arizona, El Oro Canyon, elev. 4000 feet, August 20, 1932. Since the description was written two additional specimens of this have been taken by the author just below the Coolidge Dam, Arizona, elevation 2600 feet, August 3, 1933.—D. K. DUNCAN, Globe, Arizona.

The Cuban Society of Natural History.—The *Sociedad Cubana de Historia Natural "Felipe Poey"* has recently been reorganized after about five years of inactivity due to abnormal political conditions prevailing in that country. Meetings will be held as before at the *Universidad Nacional* in Havana, the first regular session was held on January 15, 1934. Dr. Carlos de la Torre has been again elected *President*. Among other officers elected for the ensuing year are the following: *First Vice-President*, Dr. A. Mestre; *General Secretary*, Dr. Carlos Guillermo Aguayo; *Director of Section of Entomology*, S. C. Bruner.—S. C. BRUNER, Habana, Cuba.

NAMABLE?

BY WM. T. M. FORBES, Dept. of Entomology, Cornell
University, Ithaca, New York.

The question has frequently been raised where the line lies between forms which may be properly given a scientific name and those that may not. Recently the dispute has centered largely about the statements of Mr. J. D. Gunder in this BULLETIN and elsewhere, with reference to species and their subdivisions. So far as the official code goes, there is no definite provision. The code merely provides rules for the naming of species and subspecies (races, etc.) without either authorizing or restricting the names for other categories. Under the conditions the following summary can be considered only a personal opinion.

Instead of making merely two categories, as Mr. Gunder does, it seems that three must be considered; namable, potentially namable and unnamable. In the category of *namable* we obviously have all true species, and such forms as in the judgment of the namer are probable enough species to deserve the same treatment. Next come subspecies, whether races (local) or based on ecological, food-plant or other definite restriction. Here no sharp line can be drawn, since local variations, etc., are of no standard size, and some line must be drawn between local forms that are distinct enough to name, and mere field forms, of which each sedentary species may contain an infinity. I think a fair rough criterion might be this: races are namable if 90 per cent determinable; that is if 90 per cent of the specimens from their type locality could be recognized without reference to the locality label. Of course the boundaries of races are not sharp unless there happens to be some physical barrier, as between island races, and we must expect material from half-way between the type localities of two races to be unworkable. Thirdly I consider those forms that take a definite place in the biological pattern of a species as namable, with the same qualification that they must be *at least* 90 per cent determinable without their labels. In this category namables will include dimorphic forms, seasonal forms and the like, including among dimorphic forms those few of Gunder's "transition forms" which are so frequently recurrent as to form a definite part of the normal picture of the species.

Secondly we have *unnamables*. There is universal agreement to consider monstrosities, mutilations, variations due to mere state of development of the individual or sporadic accident, chance mon-

grels between mere subspecies and the like as unnamable. And of course nothing deliberately made by man is namable in this sense, regardless of what we may allow to the horticulturist for his convenience. I should also put in the unnamable, unique aberrations which are neither common enough nor of such a character as to be likely to be mistaken for species if not specially tagged. And finally the members of the following category will revert to the unnamable so far as there do not exist special reasons for giving them names.

Thirdly there is the classification of *potentially namable*. I believe this group cannot be strictly defined, and that much must be left to the judgment and good taste of the worker. In general I believe that in this class one may be much more radical in working out a definite revision, where the various named forms are brought together and properly compared, than they would be in isolated cases. Firstly there will come a limbo of local forms not quite sharply enough defined to name in their own right—for the sake of example, perhaps those from 75 per cent to 90 per cent recognizable. These might well be discriminated where abundant material and unified publication make a definite and solid picture possible, but certainly should not be made the subject of scattered descriptions. Second there are those cases where a name will serve to clear up some existing source of confusion, for instance, where a form of one species has been already credited by mistake to another, or where an aberrant form is of such a striking character of such frequent occurrence that it is likely to be mistaken for a good species. Thirdly there are hybrids. My own taste would be to relegate these last to the category of unnamable, on the ground that the formula of naming them by their two parents, with an x between the names, is sufficient, but they have already been recognized by the code, and so, I suppose, must be allowed.

It will be noted that I say nothing about inherited characters (Mendelian forms, etc.) *vs.* forms the direct effect of environment: I believe this distinction is of no importance for our present problem. It is of course biologically of fundamental importance, but the distinction is better expressed in other ways than by nomenclature; in particular those who are working on Mendelian inheritance have already their own system of nomenclature, with arbitrary abbreviations and formulae, which expresses the complexities of their problems much better than any system of scientific names could do, and which they will obviously go on using. As to the so-called "transition form," which has started so much of this discus-

sion, I believe that it is no unitary concept at all, and that the individual cases should be treated individually. In general they will have the character of aberrations, potentially namable if they are so recurrent as to be part of the regular pattern of the species or so striking as likely to be mistaken for species, but in general not to be named. Here also I should give more latitude in the case of a unified study which might cover the whole pattern of variation of a species. If I am not mistaken, like other aberrations they divide in two categories, about half (such as most cases of albinism and melanism) being Mendelian, and the other half (the fusisms as a rule) being direct responses to abnormal environments. A few (pellucidism) come rather in the class of minor monstrosities, and should be considered basically unnamable.

OUR INDICES.

The indices to the BULLETIN OF THE BROOKLYN ENTOMOLOGICAL SOCIETY and to ENTOMOLOGICA AMERICANA are more than a simple listing of names and pages. They are made rather from the point of the view of the technical user than from that of the mere library cataloguer. Hence, we reserve for the Tables of Contents the segregation of articles into the families or other categories of which they treat; and the indices become an alphabetical list of all genera and species, without indication of, or segregation into separate lists for each Order. However, we show in the BULLETIN index six categories, namely: valid species, synonyms (both as recognized by the authors of articles); new species, plants, and animals other than true insects; and since the primary interest of the Society is in the Long Island Fauna, the species reported from that region are also designated. In the ENTOMOLOGICA AMERICANA indices we omit the last-mentioned segregation, but we have the others.

In other words, it is possible for the botanist to find his plants at a glance, without having to read the whole volumes or the indices through. The mammalogist or the arachnologist may also find the objects of his study with a minimum of sterile work. The specialist may likewise discover immediately if there are any new species in his group, or new synonyms to be reckoned with.

In short, our indices are not only the keys to each volume, but they are also—within limits—an analysis of its contents; and taken in connection with the tables of contents, help to reduce dead labor to a minimum.

J. R. T.-B.

**CONCERNING SOME AQUATIC AND SEMIAQUATIC
HEMIPTERA FROM AUSTRALIA.**

H. B. HUNGERFORD, Lawrence, Kansas.*

Through the kindness of Mr. H. Hacker I have received for study some insects taken in the vicinity of Brisbane, Queensland, Australia, in December, 1932. Since the shipment contains a genus new to Australia it seems worth while to present this brief report. During the past ten years Herbert M. Hale has published a number of valuable papers dealing with the Aquatic and Semiaquatic Hemiptera of Australia. These papers should stimulate further collections and studies of the water bugs of the Australian continent and add materially to our knowledge of this interesting ecological group.

PLEIDAE.

Plea brunni Hale. Records of South Australian Museum, Vol. II, No. 3, June 30, 1923, pp. 421-422, Fig. 371.

A good series of what appears to be this species. The description and the figure fail to note however the constriction of the lateral margin of the pronotum just behind the anterior angles, a character that is marked in the specimens before me.

NOTONECTIDAE.

Enithares bergrothi Mont. Rev. Ent. Fr. XI, 1892, p. 71.

A fair series of this species.

Paranisops inconstans var. *lutea* Hale. Proc. Linn. Soc. New South Wales, XLIX, Pt. 4, 1924, pp. 463-464, pls. XLVII & XLVIII.

There are two males and four females of this interesting insect. A figure of the male genital capsule is presented on plate V, to show the long flat claspers or parameres. The capsule itself is cleft behind as in *Notonecta*, *Enithares*, *Nychia* and *Martarega*. This genus is certainly intermediate between the above group of genera which I assign to the subfamily Notonectinae and the Anisopinae which includes *Anisops*, *Buenoa* and *Paranisops*. *Paranisops* has a labrum like Notonectinae and a cleft genital capsule

* Contribution from Department of Entomology, University of Kansas.

like Notonectinae yet I agree with Hale in assigning it to the Anisopinae because it possesses the claval orifice and appears to have oxyhaemoglobin cells in the abdomen. The general appearance, shape of the legs and antennae also suggest Anisopinae. Mr. Hale's types came from New South Wales and it is a pleasure to add this record from Queensland.

Anisops stali Kirkaldy. Wien. Ent. Zeit. XXIII, 1904, p. 113.

One female specimen of this larger species.

Anisops doris Kirkaldy. Wien. Ent. Zeit. XXIII, 1904, p. 112.

A series of 9 specimens. There is in addition another species which I cannot identify.

CORIXIDAE.

Sigara truncatipala (Hale). Rec. S. Australian Mus. II, No. 2, Apr. 3, 1922, pp. 314-316, Fig. 341.

A good series of this species.

Sigara halei n. species.

(= *Sigara sublaevifrons* Jaczewski (not Hale). Archiv. für Hydrobiologie 1931, XXIII, pp. 507-509, Figs. 1-6.

Dr. Jaczewski figured and redescribed a male from the Zoological Museum in Hamburg which he thought must be *Sigara sublaevifrons* (Hale). However, I have studied paratypes kindly sent to me by Mr. Hale and find that Dr. Jaczewski had another species which is smaller, darker and the male of which has serrations on the curved tip of the right clasper or paramere. In Hale's *S. sublaevifrons* these serrations are lacking.

Sigara halei n. sp., is 4.8 mm. long in the male and not quite 5.4 mm. long in the female. The width of the head in the male is 1.6 mm., in the female 1.7 mm. It is thus the smallest species described from Australia. It is dark and shining. The pronotum is crossed by 6 or 7 yellow bands which are narrower than the dark ones. The hemelytra are dark; the clavus with a few oblique narrow yellow bands at basal angle, elsewhere the pale markings are slender, irregular lines; on the corium the small yellow figures are arranged faintly into longitudinal series. The membrane is also pigmented and figured. The face of the male has a broad oval depression. In *S. sublaevifrons* (Hale) this is much less marked. The notes and drawings of structure given by Dr. Jaczewski apply to this species. I am designating as types of this species the five specimens before me.

Agraptocorixa parvipuncta (Hale). Rec. S. Australian Museum II, No. 2, Apr. 3, 1922, pp. 320-321, Fig. 344.

A dozen specimens of this species.

Agraptocorixa euryonome Kirkaldy. Ann. Mag. Nat. Hist. (6), XX, 1897, p. 54.

A single female specimen.

BELOSTOMATIDAE.

Sphaerodema rusticus (Fabr.)? Syst. Ent. p. 691, n. 2 (1775).

Fourteen specimens. Whether this Australian species is the same as the one recorded for the oriental region I do not know. The genus should receive a careful revisional study.

NAUCORIDAE.

Naucoris congrex Stål.

A long series.

NEPIDAE.

Laccotrephes tristis Stål. Öfv. K. V. Ak. Förh. XI, 1854, p. 241.

One male and 2 nymphs.

Ranatra longipes Stål. Öfv. Vet. Akad. Förh. 1861, p. 203.

Four adults and four nymphs.

GERRIDAE.

Gerris euphrysone Kirk. Ent. XXXV, 1902, p. 138.

Ten specimens, all apterous.

Limnogonus skusei (Bueno). Bull. Brooklyn Ent. Soc. XXI, p. 129 (192).

(*Hydrometra australis* Skuse. Rec. Aust. Mus. II, 1893, p. 42, Pl. XI, Fig. 3.)

Four specimens, all apterous.

Gerris antigone Kirk. Ann. Soc. Ent. Belge. XLIII, 1899, p. 507.

Five specimens, all apterous.

NAEOGEIDAE (= Hebridae).

Naeogeus axillaris Horváth.

= *N. latensis* Hale.

One female specimen.

Merragata hackeri n. sp.

Size: Length including hemelytra 1.75 mm.; width at humeri .85 mm.; width of head across the eyes is to the width at humeri as 29:60.

Color: Head, thorax, hemelytral veins and sternum, brown, antennae and legs lighter. Last segment of antenna, spot behind each ocellus, connexivum and abdominal venter dark brown, nearly black. Claval area of hemelytra white, membrane smoky with some indefinite whitish spots.

Structural characteristics: Somewhat hirsute but appendages by no means as hairy as Distant's figure of *Merragata pallescens* in Fauna Brit. India—Rhynchota Vol. V, p. 133. Head with two parallel depressed longitudinal lines on vertex; anterior margin of pronotum elevated into a collar; lateral margins twice constricted, front one just behind the collar and other just before the middle; two longitudinal ridges on anterior part of pronotum, separated by a groove and bordered laterally by a deep depression; surface of posterior lobe of pronotum uneven, with faint longitudinal ridges and pitted depressions; anterior lobe of scutellum transverse and elevated; posterior lobe depressed with median longitudinal carina and tip of lobe appearing entire in museum specimens but slightly incised in cleared mount. Venation of hemelytra as shown in drawing. The antennal formula for segments as follows: 1st: 2nd: 3rd: 4th:: 9: 9: 8: 12. The last segment a little thicker than the others at its middle. The formula for the legs as follows: Front leg: femur: tibia: tarsus:: 29: 29: 10; Middle leg: 32: 28: 10; Hind leg: 38: 40: 14. The genital capsule of the male as shown in the figures on Plate V. The claspers or parameres are sturdy and bent.

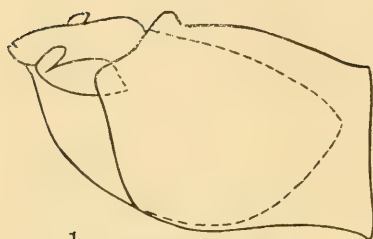
Location of types: Described from 20 specimens from Brisbane, Queensland, Australia, taken in December, 1932, by H. Hacker, in whose honor the species is named. Holotype, allotype and some paratypes in Francis Huntington Snow Entomological Museum of the University of Kansas. Paratypes also in British Museum and in South Australian Museum at Adelaide, Australia.

Comparative notes: This species is less hirsute and smaller than *M. pallescens* Dist. and the first representative of the genus from Australia.

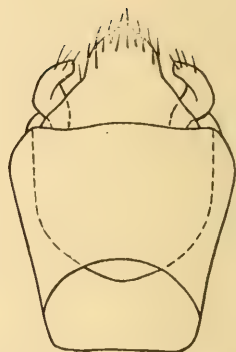
VELIIDAE.

Microvelia paramoena Hale. Arkiv. f. Zool. K. Svenska Vet. Akad. XVII, A. 1925, p. 8, fig. 5.

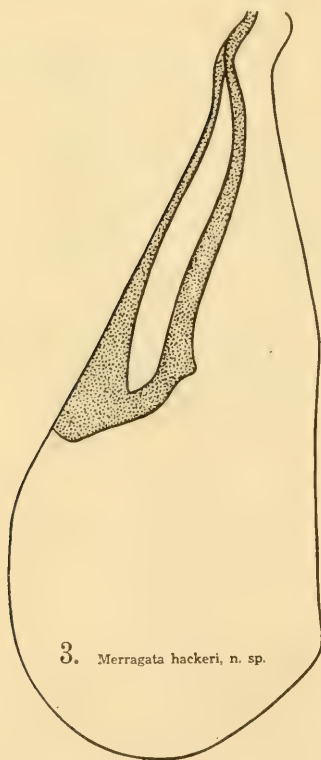
A good series both winged and apterous. The ventral side of the first genital of the male is provided with a pair of small elevated processes.



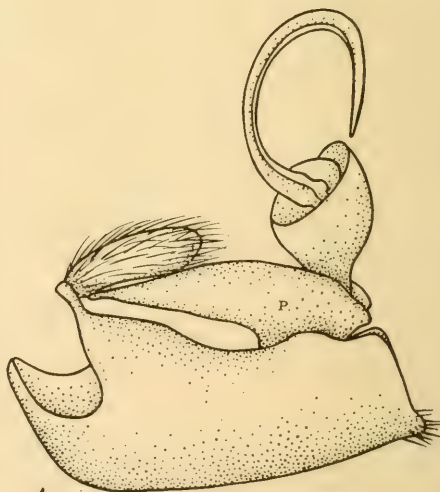
1. *Merragata hackeri*, n. sp.



2. *Merragata hackeri*, n. sp.



3. *Merragata hackeri*, n. sp.



4. *Paranisops inconstans* var *lutea* Hale.

PLATE V.

1. Male genital capsule from right side.
2. Male genital capsule from above.
3. Left hemelytron.
4. Male genital capsule from left side. S=suranal plate; P.=paramere. Note that the genital capsule is cleft behind. The parameres are alike in shape.

**PAPILIO TROILUS ATTACKED BY POLISTES
RUBIGENOSUS WHILE MATING.**

BY HAROLD O'BYRNE, Webster Groves, Missouri.

I have already called attention to the considerable variety of insects preyed upon by the wasp *Polistes rubigenosus* Lept.¹ The following note adds another interesting record to the list.

At Ranken (between Valley Park and Eureka, in St. Louis County), Missouri, on July 29, 1933, I noticed a pair of *Papilio troilus* Linn. taking their nuptial flight. I followed closely and noted that the female was carrying the male, when a *Polistes rubigenosus* suddenly started in pursuit of them. The female, burdened with the inert male, was flying heavily, and the wasp had no difficulty in keeping close behind. When the butterflies came to rest on a low branch of a shrub, the wasp attacked at once, seizing the body of the male with its legs. A violent struggle ensued, during which the butterflies separated and the female escaped. The wasp continued to grapple with the male but was unable to attain a position favorable for stinging the prospective victim because of its rapidly fluttering wings. After a full minute, the butterfly beat its assailant off and escaped unharmed.

In the region southwest of St. Louis, these two species are among the most abundant and conspicuous representatives of their respective orders, yet I have never before, in many years of observation, seen *rubigenosus* attempt to molest this butterfly. The present observation suggests that the infrequency of such attacks is not due to disinclination on the part of the wasp so much as to the inability of the wasp to catch the butterfly because of its normally rapid and erratic flight. In this instance, the female was hampered by the weight of the pendant male. Its flight was consequently slower and more direct than usual; the wasp at once perceived this difference and started in pursuit.

¹ An attack on a cicada by *Polistes rubigenosus*. Can. Ent., lxx, 6: 129. June, 1933.

NEW RECORDS OF INDIANA CHRYSOMELIDAE.

ALBERT W. TRIPPEL, Mishawaka, Indiana.

In the past year the author has examined some 6,000 specimens of Chrysomelidae collected throughout Indiana by members of the staff of the Entomology Department and students in entomology at Purdue University, or himself. The identifications were checked or corrected by Mr. Charles F. A. Schaeffer, of the Brooklyn Museum; Prof. L. G. Gentner, of Oregon Agricultural College Experiment Station, and Dr. H. C. Fall, of Tynsboro, Massachusetts.

In several previous studies of Indiana insects the county has been used as a unit for recording distribution; this practice is followed in this paper, but specific localities are also given if available.

The specimens in the Purdue Student Collection were collected by students of entomology as part of their class work. Records of these specimens and specimens collected by Montgomery alone or with the author are indicated by the initials "P. U.," "M.," or "M. and T.," respectively. All other specimens except where the name of the collector is indicated were taken by the author.

All dates except those specifically indicated otherwise are from collections made in 1932.

——— *Donacia texacana* var. *minor* Schffr.¹

Gibson Co., 3 specimens, June 12, 1925 (M.); June 17, 1925 (M.).

15253 *Lema trilineata* var. *trivittata* Say.

Jefferson Co., Madison, Aug. 3 (P. U.); Morgan Co., June 28, wild sweet potato (Musgrave); Tippecanoe Co., May 1, 1931 (P. U.); May 3, 1931, weeds (P. U.); May 14, 1931 (P. U.); May 15, 1931 (P. U.); Aug. 10, 1931, *Datura* (M.); 2 specimens, July 26 (P. U.); Sept. 16, *Datura* (M.); 2 specimens, Sept. 17, *Datura*; Sept. 28, roadside (Musgrave and Deay).

This variety has not been recorded from the state previously although Blatchley's material of *Lema trilineata* not improbably included specimens of it, which he did not consider distinct.

15382 *Pachybrachys confederatus* Fall.

Knox Co., 4 specimens, July 11, 1929 (M.); Posey Co., 2 specimens, July 11, 1929 (M.).

15412b (?) *Pachybrachys cephalicus* var. *parvus* Fall.

Kosciusko Co., June 27 (Gould).

¹ The arrangement and nomenclature used is that of Leng (1920) or Leng and Mutchler (1927) except in cases where more recent authoritative revisions have shown this to be in error.

Fall in letter states, "Near this variety which it may be, though not typical."

15413 *Pachybrachys roboris* Fall.

Knox Co., 2 specimens, July 11, 1929 (M.); Kosciusko Co., July 8 (Gould); Posey Co., July 11, 1929 (M.); St. Joseph Co., July 25, sumac; Tippecanoe Co., July 6 (M.); Sept. 24, herbage.

15415 *Pachybrachys relictus* Fall.

St. Joseph Co., 2 specimens, June 15, 1931, dewberries, June 15, dewberries.

15495c *Cryptocephalus venustus* var. *ornatulus* Clav.

Clark Co., July 15, 1931 (P. U.); June 13 (M.); Jefferson Co., Madison, June 26, 1930 (P. U.); Porter Co., Mineral Springs, 2 specimens, Aug. 31, 1925 (M.).

15495d *Cryptocephalus venustus* var. *simplex* Hald.

Clark Co. (Ruby); Knox Co., Aug. 9, 1929 (M.); Jefferson Co., Madison, June 29, 1930 (P. U.).

15500 *Cryptocephalus calidus* Suffr.

St. Joseph Co., 3 specimens, Aug. 11, bluegrass.

15566 *Graphops varians* Lee.

St. Joseph Co., July 12, red beets.

15626b *Paria canella* var. *gilvipes* Horn.

St. Joseph Co., June 12, 1931, red clover; Aug. 22, locust; Tippecanoe Co., Feb. 15, 1925 (P. U.); Apr. 26, 1925 (P. U.); 16 specimens, Sept. 24, hickory (M. and T.).

15626j *Paria canella* var. *scutellaris* Notm.

Tippecanoe Co., May 15, 1931 (P. U.); July 20, willow.

15655a *Zygogramma suturalis* var. *casta* Rogers.

Clark Co., July 12, 1931 (Baker); Clinton Co., Frankfort, 1926 (P. U.); Knox Co., Aug. 8, 1929 (M.); 9 specimens, Aug. 9, 1929, sweeping herbage (M.); 17 specimens, Aug. 9, 1929 (M.); 11 specimens, Aug. 20, 1929, sweeping weeds (M.); Lawrence Co., July 11 (Musgrave); Porter Co., Mineral Springs, Aug. 31, 1925 (M.); Sept. 3, 1925 (M.); Posey Co., Aug. 23, 1924 (M.); Pulaski Co., July 25 (Gould); St. Joseph Co., June 17, 1931, mint along roadside; 3 specimens, July 25, ragweed; Tippecanoe Co., 2 specimens, July 19, blue grass; July 19, sweeping weeds; 29 specimens, July 20, asparagus; 2 specimens, Sept. 24, sweeping herbage; Sept. 24, lamb's quarter; Sept. 25, ragweed; Sept. 26, weeds; Sept. 28, roadside weeds (Musgrave).

15678 *Calligrapha pnirsa* Stål.

Tippecanoe Co., June 17 (P. U.).

——— *Phaedon americana* Schffr.

Kosciusko Co., May 20 (Gould).

——— *Trirhabda borealis* Blake.

St. Joseph Co., July 11, grass along St. Joseph River.

20192 *Galerucella cribrata* Lec.

Lawrence Co., Bedford, 2 specimens, July 25, 1931 (M.); Clark Co., Henryville, 3 specimens, June 13 (M.); June 17, 1930 (P. U.); June 13, 1931 (Manuel); June 15, 1931 (Manuel); July 3, 1931 (McQueen); July 9, 1931 (Myers); 2 specimens, July 11, 1931 (Manuel); 2 specimens, July 12, 1931 (Baker); July 12, 1931 (Myers); July 14, 1931 (Harden); July 22, 1931 (McQueen); July 23, 1931 (Sweigart); July 26, 1931 (Baker); Jefferson Co., Madison, June 25, 1930, clover field (P. U.); St. Joseph Co., grass along St. Joseph River; Tippecanoe Co., July 10 (Deay).

20208 *Disonycha davisi* Schffr.

Tippecanoe Co., Oct. 1, 1931.

15946 *Haltica foliacea* Lec.

Knox Co., 3 specimens, July 18, 1929 (M.); 5 specimens, Aug. 9, 1929 (M.); Aug. 16, 1929 (M.).

16106 *Anoplitis rosea* (Web.).

Lawrence Co., Bedford, July 26, reared from *Chenopodium album* (Marshall); Lawrence Co., Aug. 21, honey locust (Musgrave); Morgan Co., June 28, wild sweet potato (Musgrave); Posey Co., 2 specimens, May 25, 1924, beating roadside bushes (M.).

16152 *Chirida guttata* var. *lucidula* (Boh.).

Knox Co., May 17, 1924 (M.); 2 specimens, May 24, 1924 (M.); Tippecanoe Co., May 20, 1926 (P. U.); Sept. 19, 1927 (P. U.); Apr. 12, 1930 (P. U.); May 25, 1930 (P. U.); June 12, 1930 (P. U.); Apr. 20 (P. U.); May 14 (P. U.); May 20 (P. U.); 3 specimens, July 19, golden rod (M. and T.); 3 specimens, Sept. 13, wild sweet potato (M. and T.).

NEW GALL MIDGES.

By E. P. FELT, Stamford, Conn.

The following are descriptions of species brought to the writer's attention some years ago and which, for one reason or other, have not been heretofore described.

Asphondylia mimosae n. sp.

Female. Length 2.5 mm. Antennae probably nearly as long as the body, sparsely haired, light brown, the fifth segment cylindrical, with a length five times its diameter. Palpi small, biarticulate, the first segment quadrate, the second one-half longer than the first. Mesonotum rather thickly haired, dark slaty brown. Scutellum yellowish brown with numerous long hairs at the lateral posterior angles, postscutellum a little darker. Abdomen rather sparsely haired, reddish brown. Halteres yellowish transparent. Coxae yellowish brown. Legs mostly dark straw, the tarsi somewhat darker. The ovipositor as long as the body.

Exuvium. Length 3 mm. Mostly a rather uniform reddish brown, the thorax distinctly more yellowish.

Gall. This appears to be a somewhat swollen, fusiform bud with a length of 6 mm. and a diameter of 2.5 mm., the exuvium protruding from near the tip of the gall.

This species runs in our Key (N. Y. State Mus. Bul. 186, p. 116, 1916) to the West Indian *siccae* Felt, from which it is most easily separated by the decidedly shorter palpi, the darker postscutellum and the lighter color of the legs.

The material was labelled as being reared from *Mimosa*, July 18, 1912, Brownsville, Tex., Exp. 2, Webster No. 6467, and was received under date of January 24, 1922, from Dr. W. R. Walton as the material from which *Ceratoncira pretiosa* Gahan was reared. The host of this parasite may have been the gall midge or another insect, apparently a Cynipoid. It was not found possible to secure the botanical name of the host. There were six specimens of the galls and four midges, apparently all females and exuviae which comprised the sending.

Types in the U. S. National Museum.

Lasioptera psederæ n. sp.

Female. Length 2 mm. Antennae dark brown. The third to sixth segments yellowish white, the third and fourth fused

and the fifth with a length about three-quarters its diameter, 21 or 22 segments. Palpi whitish, transparent. The first and second segments with a length one-half greater than the diameter, the third longer than the second and the fourth about twice the length of the third. Mesonotum a nearly uniform dark brown, sparsely haired, the anterior-lateral margins sparsely white scaled. Scutellum dark brown, postscutellum yellowish brown. Abdomen with the basal segments thickly white scaled; the other segments a nearly uniform dark brown and sparsely margined posteriorly with dull yellowish scales. Ovipositor probably nearly as long as the body, yellowish, the terminal lobes narrowly oval. Costa dark brown, the third segment uniting with the margin at the basal half. Legs mostly dark brown, the articulations of the tibiae and tarsi narrowly ringed with yellowish white. Tarsi dark brown, the posterior with silvery reflections in certain lights.

Larva. The larva is reddish yellow. "On the dorsal side near the caudal end there is a heavy black horn which, at its origin, appears to be under the skin at the base of the last segment and which projects out through the last segment. These larvae lie in their cells with the head towards the center of the gall." They were nearly full grown the last of April before the plants were in leaf. The change to the pupa occurs about the middle of May.

Gall. "These galls are corky formations about half an inch in diameter and varying from almost round to long galls, some being an inch or more in length. . . . The general position of the larval cell is, as a rule, in a plane almost perpendicular to the long axis of the gall which is the same as the course of the woody portion of the root. They are arranged in an irregular order close to the wood of the root."

This species runs in our Key (N. Y. State Mus. Bul. 198, p. 108, 1917) to *Lasioptera farinosa* Beutm., from which it may be most easily separated by the yellowish white third to sixth antennal segments and the dark brown scutellum. Described from one dried female reared in June, 1924, by Joseph A. Reeves, then at the Ohio State University, Columbus, from a root gall on Virginia Creeper. The type is in the New York State Museum. The above quoted descriptions of the larva and the gall are from Mr. Reeves' notes. The describer is unable to offer an explanation for the peculiar structure he observed near the caudal end of the larva.

NOTES ON SOME INSECTS FOUND IN THE BUR-
ROWS OF THE CALIFORNIA GROUND
SQUIRREL IN ORANGE COUNTY,
CALIFORNIA.

BY A. C. DAVIS, Takoma Park, Md., and K. D. SLOOP,
Berkeley, Calif.

It has been known for some time that some rather rare beetles might be captured in the spring of the year by examining the entrances of the burrows of the California ground squirrel, *Citellus beechyi beechyi* (Richardson). As far as we could learn, none of these burrows had ever been excavated for the purpose of collecting insects, hence the present paper.

In most parts of Orange County, California, the burrows are made in adobe that is almost as hard as brick, and their excavation was impossible in the limited time at our disposal. In the vicinity of Cypress, California, however, in the spring of 1930, we found a field that had evidently been overlooked in the annual poisoning campaign against the squirrels, since it contained upward of 75 burrows, most of them occupied. The soil was a light sandy loam, and the water here comes within 2 or 3 feet of the surface of the ground, insuring against having to dig down 6 feet or so to reach the nest. In this field we dug out nine burrows, exploring them as thoroughly as possible. In addition to this, the loose dirt was removed and carefully sifted from the inside of possibly 50 more burrows for as far as we could reach.

In general these ground squirrel burrows are from 2.5 to 3.5 inches in diameter, radiating from the vicinity of the nest chamber, with many turns and blind passages. The total length of the various galleries varies from a few feet to 100 feet or more. The nest chambers are usually although not always, at the ends of short lateral passages from the main galleries. The nests are made of dry grass, grass-roots, etc. An excellent account of the burrows and nesting habits of the squirrels is given by Grinnell and Dixon (1).

When one nest chamber becomes uncomfortable for one reason or another (probably on account of accumulation of vermin and rubbish) the squirrel moves out and constructs a new nest. The old chamber is then used as a dump for deposition of faeces and rubbish. It is in these rubbish, or dung chambers, that the greatest numbers of insects are taken, although they are also found in the galleries and in the occupied nest chamber.

The present list is by no means complete—it barely grazes the

surface of the subject, in fact—but contains some records that we hope will be of interest. Coleoptera predominate in the nests, but such other insects as came our way were taken and preserved.

DIPTERA.

Lasiopogon bivittatus Loew. One specimen of this small fly was taken within a burrow at Cypress, on February 22. Its presence here was probably accidental.

Pseudoleria pectinata Loew. Cypress. February and March. Two specimens were taken in the burrows and numerous others were seen about the entrances. It is common to see these insects rise from the burrows and fly a few feet as one approaches.

Pegomyia ruficeps Stein. This fly is apparently a normal inhabitant of the burrows. Numerous larvae and pupae were found in the dung chambers and one adult was reared from a puparium so secured.

These three species were identified by Mr. C. W. Johnson.

Other flies of at least three species are commonly seen about the entrances of the burrows, but whether or not these go into the passages is not certain.

SIPHONAPTERA.

Fleas are very common throughout the galleries and especially so in the beds. There must be 300 or 400 to a burrow. On warm days they may be seen about the entrances. McCoy (2, pp. 46-47) reports *Ceratophyllus acutus* Baker and *Hoplopsyllus anomalus* Baker as commonly infesting ground squirrels in California, and has proven the former to be a carrier of bubonic plague from squirrel to squirrel; and, since these fleas will bite man upon occasion, they are perfectly capable of transmitting the disease from squirrel to man. There have been cases of persons contracting bubonic plague in California under circumstances that conclusively pointed to squirrels as the carriers.

HYMENOPTERA.

A number of specimens of a small wasp, parasitic upon the larvae of flies within the dung chambers, were secured in Cypress.

Upon various occasions and in several localities large ants, probably of the genus *Formica*, were seen carrying fly pupae and larvae from the holes.

COLEOPTERA.

Of this order 21 species were taken, 3 of which are probably peculiar to the burrows, at least in the larval stages, and 7 of which seem to be regular inhabitants, although found also in other places.

Amara insignis Dej. Two specimens were found in the main gallery of a burrow at Cypress, February 22. Probably the burrow served them merely as a temporary refuge during daylight.

Ptomaphagus californicus Lec. Several specimens were taken from the dung chamber of a burrow at Cypress in February, and a number more were sifted from the dirt from within the entrances of burrows on different dates. Two were taken from near the entrance of a burrow in Santa Ana Canyon in February. This beetle, while probably not confined to the burrows, is undoubtedly a regular inhabitant of them.

A number of Staphylinidae, mainly Aleocharini, were taken from 1929 to 1931 about the burrows in various localities. They occur commonly in the nest and dung chambers. None of these have been determined.

Hister sexstriatus Lec. Cypress, February 22. One specimen found in the dung chamber of a burrow.

Hister umbilicatus Csy. Cypress, February 22. One specimen.

Saprinus pectoralis Lec. Cypress, February. Several specimens taken from the dung chambers of various burrows.

Saprinus obscurus Lec. This species was very numerous in all the burrows examined, and especially so in the dung chambers. This and the two following species are apparently regular inhabitants of the burrows, although not peculiar to them.

Saprinus sp. Cypress. Very numerous in the dung chambers. Of this, Mr. H. C. Fall says in a letter, "... a form between *paemosus* and *obscurus* and represented in the Leconte collection by examples placed with *obscurus*. I am inclined to believe, however, that it is a variety of *paemosus*."

Saprinus paemosus Lec. Cypress. Very numerous along the galleries and in the nest and dung chambers. It appears either that this and *obscurus* may be one very variable species or that they are naturally hybridizing in the burrows.

Notoxus cavicornis Lec. One pair found in a burrow at Cypress in the material of the nest. Their presence was probably accidental.

Metoponium convexicollis Lec. Santa Ana Canyon, March 1. Three specimens taken near the entrance to a burrow.

Blapstinus sulcatus Lec. Three or four specimens found near the entrance of a burrow in Santa Ana Canyon, March 3.

Eleodes dentipes Esch. Numerous in burrows everywhere. At Cypress about 20 specimens were found closely packed into a lateral gallery about 4 inches long. It is almost sure that although these Tenebrionidae, and especially *Eleodes*, regularly use the burrows as retreats during daylight, they are not otherwise associated with them.

Aphodius granarius (L.). Cypress, February and March. Two specimens were found in the entrances to two burrows.

Aphodius lividus (Oliv.). Several specimens were taken at Cypress, at Costa Mesa, and in Santa Ana Canyon, in the entrances of burrows.

Aphodius rugatus Schm. Cypress, Costa Mesa, and various other localities, from late fall to early spring. In February, at Cypress, only a few specimens were found in the lower galleries, most occurring within 3 feet or so of the entrances. A few specimens were taken in the dung chambers. There were so many Scarabaeid larvae of different sizes in the chambers that it could not be determined definitely whether or not those of *rugatus* were present, but it seems fairly certain that the main brood emerges in the late fall, after the first rains. These pretty little beetles may be taken all through the winter and early spring about the entrances of the burrows. They have been in nearly every burrow examined, and as many as five have been taken from the entrance to a single burrow. They may also be found under bricks, boards, etc., at some distance from any burrow, after the first soaking rain in the fall (see H. C. Fall, Ent. News, VI; 1895, p. 108). This species is without doubt a regular inhabitant of the burrows and in all probability breeds nowhere else.

Aphodius rubidus Lec. This beetle is not uncommonly taken in flight on warm days in all parts of southern California, but we are not aware that its breeding place has heretofore been recorded. It was found in large numbers in the galleries and dung chambers of all the burrows opened at Cypress, and larvae and newly emerged adults were taken from the dung chambers and the soil immediately surrounding them. More than 200 adult specimens were taken from a single burrow. The species is undoubtedly peculiar to the burrows in its immature stages.

Aphodius unguatus Fall. Cypress, February. Two specimens were taken by sifting the dirt about the burrow entrances and several more were found in the galleries and dung chambers. In all, enough of this species was found to demonstrate fairly well that

it is a regular inhabitant of the burrows. As nothing has been recorded of the habits as far as we can find, it seems reasonable to suppose that it may be peculiar to the burrows in its early stages.

Trox atrox Lec. Taken in small numbers at Cypress and Costa Mesa on several dates. It was present in nearly all burrows examined, and seems to be a regular inhabitant, although found elsewhere.

Trigonomoscuta pilosa Mots. Two specimens, Cypress, February. Being a feeder upon grass roots and therefore subterranean, its presence here is not to be wondered at, although it probably has no significance.

Calendra granaria (L.). One specimen, Cypress.

Aphodius luxatus Horn. Was said by Mr. A. T. McClay, if a conversation with him is remembered correctly, to occur about the entrances to burrows at Berkeley, California.

The Coleoptera mentioned above were all identified by Mr. H. C. Fall, with the exception of *Aphodius luxatus* Horn.

The best time to investigate the burrows is in the winter and early spring after the rains have soaked and softened the ground. There is very little in the way of collecting to be done at this time of the year, so the collector does not feel that he is working hard for rather meager results, or that he might be more profitably employed elsewhere.

LITERATURE CITED.

1. Grinnell, J., and Dixon, J. 1918. Natural History of the Ground Squirrels of California. Monthly Bul. Calif. State Comm. Hort., 7: 11-12, 597-708.
2. McCoy, G. W. 1911. Studies upon Plague in Ground Squirrels. U. S. Public Health Bul. 43, 71 pp., illus. Washington (Printing Office).

Note on Heteroptera in Wood Rat Nests.—The few bugs taken under like conditions by Mr. Davis were sent to me for naming. There were three species, of no ecological significance. One was the aradid *Mezira emarginata* Say; and one each of the two lygaeids *Crophius angustatus* Van Duz. and an undetermined species of *Eremocoris* (not *ferus* Say). The first species named lives under loose bark of dead trees; possibly it was in a casual hibernaculum, since I have thus found *Aradus robustus* Uhler under fallen leaves in winter. Of the other two, *Crophius* is a denizen of grasses and field weeds.—J. R. DE LA TORRE-BUENO, White Plains, N. Y.

BOOK NOTES.

The History of the Entomological Society of London, 1833-1933, by S. A. Neave and F. J. Griffin, with an Introduction by E. B. Poulton and a Financial Chapter by A. F. Hemming. (Pp. i-xxviii + 1-224, pls. I-VII. (Published by the Society, London, 1933)).

This is a fascinating record of one of the great (if not the greatest) entomological societies of the world, of its vicissitudes, its successes and its accomplishments. It contains the honored names of the Rev. F. W. Hope, of John Obadiah Westwood, W. B. Spence, and J. Curtis among its founders. Other great and outstanding names in its roll are Charles Darwin, the Rev. Wm. Kirby, James F. Stevens, Thomas Wollaston, H. T. Stainton, Robert McLachlan, H. W. Bates, Lord Walsingham, G. H. Verrall, F. C. Godman, Eleanor Ormerod, Osbert Salvin, G. C. Champion, Lord Avebury (Sir John Lubbock), all now gone from the scene of their labors. To mention those living now would be to recite the tale of the great British leaders of the science, led by Dr. E. B. Poulton.

The low ebb of the Society was between the years 1856 and 1870, when dissension of one kind or another existed in its ranks. Since the latter date, however, harmony and progress have distinguished it. It now owns its own home, with a beautifully appointed meeting room. Its finances, weak in the formative period, under able management, are now most flourishing.

Today, the Society publishes three ranking journals—the Proceedings, the Transactions and Stylops.

A most interesting part of the record is the list of members with their years, from its foundation, when it had some thirty or forty, until in 1933 when it had 685 Fellows.

The plates include portraits of Kirby, Westwood and Poulton.

Methods for the Study of the Internal Anatomy of Insects, by Clarence H. Kennedy. (Pp. 1-103, numerous figures, not numbered. C. H. Kennedy, Ohio State University, Columbus, Ohio. \$2.).

This work of Dr. Kennedy's is an extremely useful compendium for the dissection of insects for the study of their minute anatomy, of methods of preparing the tissues, and of devices for studying them. It does not start by assuming that the user possesses any previous knowledge of the subject, hence all directions are lucid

and complete. It also gives directions for preserving, hardening, staining and mounting of tissues, telling the end to be attained and the tested way to do it.

To the writer, the most interesting section is XI, Apparatus and Tools. Here are set forth in clear terms the use of the microscope, microtome, and camera lucida; of methods of lighting and devices therefor; micrometer eye-piece, various dissecting tools (and how to make them), and of many others. Section XII, Concerning Illumination, is also most useful for the student of insects under the microscope; and so is Section XIV, Drawing and Making Illustrations, including suggestions for lettering and arranging plates. A useful list of works on the subject and a full index complete the work.

A working entomologist who meets so many minor problems will find this a useful work to have on his table for ready reference.

Les Larves des Coleopteres d'apres A. G. Böving et F. C. Craighead et les Grands Criteriums de l'Ordre, par P. de Peyerimhoff. (*Annales de la Société Entomologique de France*, CII: pp. 77-106. March, 1933.).

In this paper, Dr. Peyerimhoff presents a critique of the paper by Drs. Böving and Craighead (*ENTOMOLOGICA AMERICANA*, vol. XI, 1931-1932). It is divided into three parts: a résumé of the work, a critical examination of the subject-matter and proposed classification, and a differing classification by Dr. Peyerimhoff based on his own interpretation of the characters of the group as a whole, adults and larvae, and on their validity. A bibliography of the principal works on classification of the Order on a combination of various foundations closes this paper.

Dr. Peyerimhoff is most warm in his praise of Drs. Böving and Craighead's monograph, as fundamental to the study and knowledge of beetle-larvae; his discussion is purely technical and factual.

It would appear needless to say that all who possess Drs. Böving and Craighead's masterly treatise should likewise have at hand Dr. Peyerimhoff's essay.

J. R. T.-B.

PROCEEDINGS OF THE SOCIETY.

MEETING OF OCTOBER 12, 1933.

The regular meeting of the Brooklyn Entomological Society was held on October 12, 1933, at the Brooklyn Museum. Mr. Wm. T. Davis in the chair, and members present: Messrs. Engelhardt, Lemmer, Torre-Bueno and Wilfert; also two visitors, Messrs. Bird, Sr. and Jr.

Minutes of the meeting of May 12th read and approved.

Mr. Engelhardt gave the treasurer's report; and Mr. Torre-Bueno that of the Publication Committee.

Mr. Engelhardt showed a specimen of the rare *Dictyosoma elsa* Stkr.

This being the first meeting of the Fall, members' summer collecting experiences were on the programme.

Mr. Wilfert collected in North Carolina; he will present his report more formally later. It was very difficult for him to find lodgings, as most houses in that section are one room huts with neither doors nor windows, except openings in the walls.

Mr. Engelhardt spoke on *Enodia portlandia* Fabr. and *E. creola* Skin. He also mentioned the praying mantis, *Paratenodera sinensis* and the fall canker-worm, *Alsophila pometaria* Harris, the latter having been a great pest in Westchester County in the past summer.

Mr. Torre-Bueno had found collecting poor in the Catskills; his full report will be made later.

On the other hand, Mr. Bird had found plenty of mosquitoes in the far North.

Mr. Lemmer reported collecting in Lakehurst, N. J. It was especially good on October 8, with a bright moon; but earlier on the same evening, before moonrise, it was much poorer.

MEETING OF NOVEMBER 16, 1933.

The regular meeting of the Brooklyn Entomological Society was held on November 16, 1933. Present: President Davis in the chair, and Messrs. Engelhardt, Moennich, Nicolay, Ragot, Schaeffer, Shoemaker, Wurster and Lemmer; and visitors, Messrs. Bird, Stecher and Dr. R. F. Hussey. Meeting called to order at 8:15 p. m.

Minutes of the meeting of October 12 were read and approved. In the absence of the Secretary, Mr. Siepmann, the Chair appointed Mr. Lemmer secretary pro tem.

Mr. Engelhardt for the Publication Committee reported the December Bulletin in press.

He also told of visiting our one time President, Mr. Wm. T. Bather at his home in Nutley, N. J.

Mr. Shoemaker showed a specimen of *Macronoctua onusta*, bred in root of lily. Mr. Wurster showed a form of *Enodia portlandia*.

Dr. Hussey said he had preserved insects taken in Paraguay in paper tubes filled with sawdust and ethyl acetate, and that they could be handled later without relaxing.

Mr. Ragot showed a walking leaf and a butterfly fish.

Mr. Bird spoke on "The Decline of Noctuid Moths, genus *Papaipema*, in the Eastern United States." He stated that the general consensus of many observers was to the effect that the *Papaipema* group as a whole were becoming exceedingly rare or totally extinct in localities where formerly they were abundant. He drew attention to the ease with which such observations could be checked, since collections in this genus were made mainly through securing the larvae in the field; the certainty of the prevalence of natural enemies or other causes against them was clearly indicated. In addition to the detrimental results of agricultural and industrial growth and a growing population, fire, through man's ruthlessness, was the final and most prevailing cause for the decline of this generic group. Specimens of the most widely separated species of this, the country's most outstanding noctuid genus, were shown, together with drawings of systematic details.

Mr. Wm. T. Davis exhibited two boxes of Cicadas of eight species collected in Oregon, Nevada and Utah in June and July, 1933. Of interest was the fact that on two very warm and sunny days in late July Mr. Engelhardt and his companions (who collect them) noticed that *Okanagodes gracilis* did not commence to sing at Las Vegas, Clark County, Nevada, until nearly dark. In the Journal of the New York Entomological Society (September, 1930), L. D. and R. H. Beamer record that they found *Okanagodes gracilis* "singing happily in the sun when the temperature was 122° in the shade." Mr. Davis said that he and Mr. Engelhardt had found *Okanagodes pallida* singing in the hot sun, June 21, 1931, along the shore of the Salton Sea in Southern California.

Dr. Hussey will speak on "Collecting Insects in Paraguay" at the next meeting.

The meeting adjourned at 9:45 p. m.

FREDERICK LEMMER,

Sec'y pro tem.

EXCHANGES

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

COLEOPTERA.—Am interested in exchanging Coleoptera. Carl G. Siepmann, R. F. D. No. 1, Box 92, Rahway, N. J.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa*, *macaria*, *mormonia*, *malcolmi*, *nokomis*; *Melitaea neumogeni*; *Lycaena speciosa*; etc. Send lists. Dr. John A. Comstock, Los Angeles Museum, Exposition Park, Los Angeles, Calif.

CATOPINI: *Catops* (*Choleva*), *Prionochaeta*, *Ptomaphagus*.—Wanted to borrow all possible specimens of these genera from North America for a revisional study. Correspondence solicited.—Melville H. Hatch, Dept. of Zoology, Univ. of Wash., Seattle, Wash.

HISTERIDAE.—Desire to obtain material, all localities, for identification, by purchase or exchange of other families. Chas. A. Ballou, Jr., 77 Beekman St., New York, N. Y.

LOCALITY LABELS.—60c per 1000, 5 in strip, 1 to 3 lines. 5 sizes type. 3½ point, 75c per 1000. Good heavy paper. Prompt service. A. L. Stevens, 691 Culver Rd., Rochester, N. Y.

I WILL COLLECT all orders of insects and allied groups for those interested. Louise Knobel, Hope, Ark.

BUY OR EXCHANGE: Pinned Microlepidoptera and papered Pieridae of North America. Full data with all specimens. Named material of all groups offered. Alexander B. Klots, College of the City of New York, New York City.

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JUNE, 1934

No. 3

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OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

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J. R. de la TORRE-BUENO, Editor

CARL GEO. SIEPMAN

GEO. P. ENGELHARDT

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Meetings are held on the second Thursday after the first Tuesday of each month from October to June, inclusive, at the Central Museum, Eastern Parkway and Washington Ave., Brooklyn. The annual dues are \$2.00.

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NEW AMERICAN HESPERIIDAE (LEPIDOPTERA, RHOPALOCERA).

By E. L. BELL, Flushing, N. Y.

Pyrrhopyge nigrocephala n. sp. (Plate VI, Fig. 1.)

Male. Upperside. Primaries black with a green sheen; the veins black. Secondaries black, with elongate green spots between the veins, extending inwardly about one-quarter of the breadth of the wing; veins black. These wings narrow rapidly toward the anal angle, in the male, thus having an elongate appearance, and are a little excavate on the outer border. Fringes of the primaries white to vein 6 and blackish from there to the apex; of the secondaries white.

Beneath. Both wings blackish with less sheen, the primaries a little paler along the inner margin.

Body on both sides blackish. Head black. Palpi beneath blue-black. Collar red. Shoulder covers black with a red spot on each side in front of the base of the primaries. Tegulae black. Pectus and anal tuft red. Antennae black.

Female. Similar to the male, larger, the secondaries more rounded, fringe of primaries darkened from apex to a little below vein 4.

Expanse. Male, 52 mm.; female, 62 mm.

Holotype male, Colombia, in collection of the author. Allotype female, locality unknown, in collection of the U. S. National Museum, Washington, D. C.

The uncus terminates in a slender arm, curved downward toward the apex. The aedocagus is long and slender. The claspers are bifid at the apex, the lower arm curved upward, pointed at the apex, serrate on the outer margin; the upper arm is shorter with a broad, somewhat rounded apex.

This species is most nearly allied to *Pyrrhopyge gellias* Godman and Salvin, *Pyrrhopyge gazera* Hewitson and *Pyrrhopyge gany-*

medes Bell, from which the outstanding superficial difference is in the black head and palpi and the lack of the projection in the outer margin of the secondaries found in *gellias* and *ganymedes*.

***Apyrrothrix mulleri* n. sp.** (Plate VI, Fig. 5.)

Male. Upperside. Primaries blackish with a green sheen, a roundish scarlet spot near the base of interspace 1. Fringes white from vein 1 to the apex. Secondaries black with a green sheen except toward the base, outer margin a little crenate with a noticeable excavation between veins 1b and 2. Fringes white.

Beneath. Primaries blackish with a green sheen, paler below vein 2, especially toward the base; a narrow orange-yellow basal stripe. Secondaries blackish with a green sheen; a narrow orange-yellow basal band extending from the costa to about the middle of the abdominal fold and produced as a thin ray on the upper and lower edges of the cell and on vein 2 as far as the end of the cell.

Thorax and abdomen above blackish-brown; abdomen beneath black, banded with orange-yellow and on the lower part of each side with narrow, orange-yellow stripes. Head black with eight white spots. Collar black with four white spots. Shoulder covers blackish-brown. Tegulae blackish with a small, basal orange spot. Palpi beneath blackish-brown with a central, oval white spot. A large white spot below each eye. Pectus black with some orange yellow hairs in the center. Legs black, striped with orange-yellow. The antennae are broken off.

Expanse: 54 mm.

Holotype male, locality unknown but possibly from Central America, in collection of the U. S. National Museum, Washington, D. C. Named for Mr. R. Muller, the collector.

Most nearly allied to *erythrosticta* Godman and Salvin from which it differs superficially in the entirely different color of the wings, in the fringes being entirely white and not cut by darker at the veins, in the entire absence of all hyaline spots of the primaries and in the narrow orange-yellow basal area of the secondaries beneath. The form of the genitalia is very similar to that of *erythrosticta* as figured by Godman and Salvin and the two insects must be closely related but the superficial differences between the two are so great that they had best be considered distinct, for the present, at least.

***Telegonus xerxes* n. sp.** (Plate VI, Fig. 2.)

Male. Upperside. Primaries brown, a narrow, indistinct

pale stripe in the apical part of the cell, beginning at the upper edge but not extending entirely across the cell, an indistinct pale spot in each of interspaces 1, 2, 3 placed similarly to those found in *Achalarus albociliatus* Mabilie, except that the spot in interspace 3 is a little further outward than that in interspace 2, a bent row of pale spots around the end of the cell, in interspaces 4, 5, 6, 7, 8, and 9, those in 7 and 9 are yellowish, that in 8 is partly hyaline. Sordid whitish scales are sparsely scattered over these wings. Fringes brown at the base, paler at the tip, which becomes whitish toward the anal angle. A prominent costal fold is present.

Secondaries somewhat elongate, the anal angle produced into a short, rounded tail-like lobe. Same color as primaries with two indistinct, narrow, darker bands, one toward the base and the other discal. At the base and along the abdominal fold are long brown hairs, with some of a pale yellowish intermixed. Fringes dark at the external angle, with a few white hairs intermixed, below this they are entirely white to around the tail-like lobe, from there to the abdominal fold brown.

Beneath. Paler brown than above, through the cell of the primaries is a longitudinal dark streak, which is divided by the pale spot of the upper side and this spot contains a few sordid white scales, the spots in interspaces 1, 2, 3, are brown, larger than above, and have slightly paler centers and form a somewhat curved row, the rest of the spots of the upper side are repeated. A narrow, paler area extends along the external border and is cut by darker veins (not so distinctly shown in one paratype); just before the apex to the subapical spots is a darker area which is continued as a narrow, ill-defined submarginal band interiorly limiting the pale marginal border. The extreme costal edge toward the apex is pale yellowish (very feebly so in one paratype). The internal border is much paler yellowish-brown, which extends streak-like into interspace 1. A pale area between the end of the cell and the subapical spots. Secondaries a little darker than the primaries, a dark brown basal spot crossing the interspace below vein 8 and followed outwardly by a nearly straight band of the same color extending from vein 8 to the abdominal fold and another band of equal length in the outer two-thirds of the wing which projects a tooth toward the middle of the cell-end and is bulged a little outward just below this, this band is separated by a narrow line of the paler ground color from the broad marginal brown area. These wings are sparsely sprinkled with sordid yellowish scales, particularly in the abdominal fold.

Body above brown intermixed with fulvous scales, beneath grayish-brown, the abdomen with the segments edged with

sordid whitish. The anal tuft is sordid yellowish at the tip. Legs sprinkled with yellowish scales, in the type very heavily so. Palpi beneath sordid grayish with brown scales intermixed. Pectus yellowish and brown intermixed. Antennae rather long, brown above, narrowly yellowish beneath, the club pale yellow with scattered brown scales before the apiculus.

Expanse. 52 mm. in the type.

Holotype male, British Honduras, in collection of the American Museum of Natural History, New York City. Allotype female, Santa Rosa, Mexico, in the collection of the U. S. National Museum, Washington, D. C. Paratypes: 1 male, Rancho Hannover, Vera Cruz, Mexico; 1 male, Rinconada, Vera Cruz, Mexico; 1 male, 3 females, locality unknown but possibly Mexico, in collection of the U. S. National Museum, Washington, D. C.; 1 male, locality unknown, in collection of the Academy of Natural Sciences, Philadelphia, Pa.; 1 male, Guatemala, in collection of the author.

This species seems to be most nearly allied to that described by Mabille as *Telegonus mithras* from Porto Cabello but among other characters it disagrees with the description of that species in that there are spots on the primaries, in addition to the cell spot, in interspaces 1-9, those of *mithras* are said to begin between veins 5 and 6 and extend to vein 3; in that the fringe of the primaries is mostly dark and of the secondaries is pure white, *mithras* being said to have dirty white fringes; in that the secondaries above have two indistinct bands, *mithras* said to be immaculate; in that the ground color of the underside is distinctly brown and not blackish. The figure of *mithras* given by Mabille does not show the tail-like lobe at the anal angle of the secondaries.

This species has been found in collections under the name *Achalarus albociliatus* Mabille, which it resembles but from which it may readily be separated by the costal fold of the male, which *albociliatus* lacks, and the more elongate secondaries with the short tail-like lobe.

The uncus terminates in two slender arms, a little hooked at the apex. The scaphium is well developed and rather long. The aedeagus carries a long, slender internal spine at about the center. The claspers are rather long and slender, the ventral edge of the terminal arm is angled outwardly at the base, turned obliquely upward toward the apex into a rounded, serrate flange, back of which, on the dorsal edge, is a prominent tooth-like projection directed obliquely inward.

Bungalotis scyrus n. sp. (Plate VI, Fig. 3.)

Male. Upperside. Primaries red-fulvous, the outer half suffused with blackish-brown; a black spot in the cell near the end; two short, black stripes in the outer three-quarters of interspace 1; a hyaline spot in the center of interspace 2, not reaching either veins 2 or 3, its outer edge straight, the inner edge rounded; a minute hyaline spot toward the base of interspace 3, both of these hyaline spots prominently encircled with black; a black dot in interspace 4; a subapical series of four spots in an oblique line in interspaces 5-8, that in 5 small and black, that in 6 larger and white hyaline, that in 7 very minute and white hyaline, that in 8 black with a pale center so minute that it can only be seen under a lens, the spots in 6 and 7 are encircled with black. Secondaries red-fulvous, the costal area above vein 6 blackish-brown; a black cell dot; a sinuous line of seven black dots in the outer three-quarters of the wing, forming a transverse band, the upper dot lying in the darkened costal area. Fringes of both wings brown, darkest at the base.

Beneath. Color as above but duller. Primaries with the apical and outer marginal area much darkened and the inner marginal area to the center of interspace 1 pale yellow fulvous. The spots of the upperside repeated. Secondaries with the outer third of the wings darkened; the black spots of the upperside repeated and in addition two spots between veins 7 and 8 and an irregularly shaped one between veins 2 and 3 in a line with the cell spot. Nearly all of these spots have a pale center.

Head, palpi (except the black tip), body above and beneath, legs, are red-fulvous. Beneath the eyes yellowish. Antennae black above, beneath yellow, on each side yellow spotted at the joints, the club yellow.

Expanse 50 mm.

Holotype male, Yumbatos, Perú, in collection of the author.

This species resembles *sebrus* Felder but the anal angle of the secondaries is more prolonged, the two black dots in interspaces 4 and 5 and the pale inner marginal area of the primaries beneath are not present in any of the specimens of *sebrus* at hand, the yellowish spots below the eyes where *sebrus* is white.

The form of the male genitalia is strikingly different from that of *sebrus*, the uncus being much shorter, the saccus much longer, the narrow terminal arm of the claspers ending in a stout hook, in *sebrus* the terminal arm is broad and obliquely truncate at the apex, the aedoeagus carries a long line of short internal spines, which are absent in *sebrus*.

Discophellus porsena n. sp. (Plate VI, Fig. 4.)

Male. Upperside. Both wings rusty-red. Primaries with apical and outer marginal areas darkened; a small, barely discernible brown spot near the end of the cell; two small black spots, one above the other, in the basal third of interspace 1, the lower one a little the larger and with three or four white scales in the center; two similarly placed ones half way between the first two and the outer margin of the wing; a larger black spot in interspace 2, directly over the outer pair just mentioned, crescent shaped and with a few central white scales; in the center of interspace 3 is another crescent shaped black spot which is rather hazy as it lies in the darkened area of the wing; an indistinct black dot near the base of interspace 6. Secondaries with the costal margin above vein 8 pale yellowish-brown, between veins 6 and 8 black; a black spot near the end of the cell and an outer row of five black spots. Fringes brownish a little paler at the tip.

Beneath. Primaries brown, the costal margin in the basal half, the cell and below it as far as vein 2 with rusty-red hairs, duller than above; inner margin a little paler, especially toward the base. The only one of the spots of the upperside is that near the base of interspace 6, which is dimly visible. Secondaries with costal area and outer margin brown with a few rusty-red scales, balance of the wings dull rusty-red; a black spot in the cell-end and two just below it, the upper one of which has a few white scales in the center; an outer band of six black spots of nearly equal size in an even and slightly curved row, all of which except the upper one, which is a little smaller, have a few white scales in the center.

Body on both sides, head, palpi beneath and legs rusty-red, the palpi a little paler in tone. Behind the eyes yellowish-white. Antennae rusty-brown above, fulvous beneath, partly ringed with black, the club black above, yellowish at the base with black transverse stripes, beneath reddish-brown.

Expanse: 62 mm.

Holotype male, Iquitos, Perú, in collection of the author.

This species resembles *porcius* Felder in having the slight projection in the outer margin of the secondaries at the end of vein 2 but differs from that species in lacking the hyaline cell spot of both primaries and secondaries, in the outer band of spots of the primaries being composed of separate spots and not forming an irregular, connected black line, in the less curved outer band of spots of the secondaries, beneath in the paler color of the rusty-red areas, in the outer band of spots of the secondaries being of nearly equal size in a less curved row, in the fringes being darker.

In addition the form of the genitalia is distinct. From *sebaldus* Cramer it differs in lacking the numerous hyaline spots of that species. It does not agree with the brief description of *fulvius* Plotz or the remarks on the male of that species by Draudt in Seitz, *Macrolepidoptera*, vol. v. *Porsena* bears some resemblance to the Mabille and Boulet figure of *diaphorus* (*diophorus* Moschler) but differs above in the darker color, darkened apical and outer marginal areas of the primaries, the broad, black costal marginal area of the secondaries, in the unchecked fringes, and on the secondaries beneath in the aligned and not broken outer band of spots, in the lack of the two spots above vein 7 and in the abdominal fold not being paler than the rest of the wing.

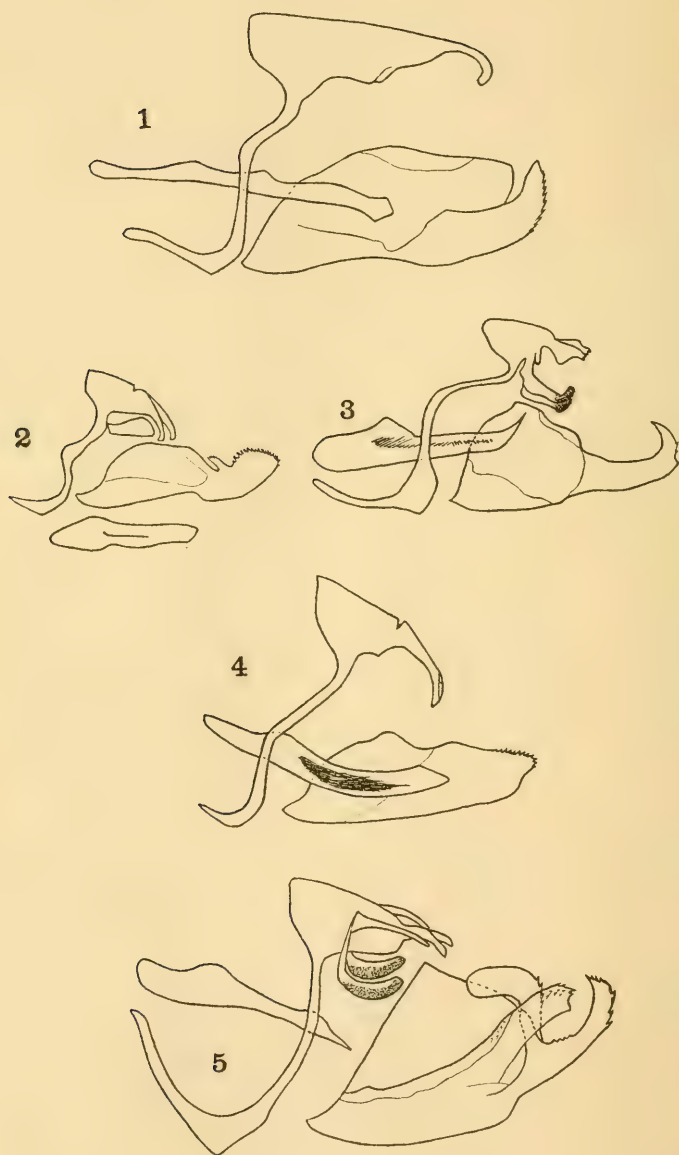
The uncus is long and slender as is also the girdle, the saccus short, the claspers are long and broad, the apex broad with a short outward projecting flange at the dorsal edge carrying a few short serrations which extend a little way inwardly. The aedoeagus is long and carries a very heavy cluster of internal spines.

EXPLANATION OF PLATE VI.

Male genitalia.

- Figure 1. *Pyrrhopyge nigrocephala* n. sp. Colombia. Type.
 Figure 2. *Telegonus xerxes* n. sp. Guatemala. Paratype.
 Figure 3. *Bungalotis scyrus* n. sp. Yumbatos, Perú. Type.
 Figure 4. *Discophellus porsena* n. sp. Iquitos, Perú. Type.
 Figure 5. *Apyrrothrix mulleri* n. sp. Locality? Type.

Richardia telescopica Gerst. found in Costa Rica. (Diptera, Ortalidae).—This species was originally described in 1860 from a single male specimen collected in Brazil. It was redescribed from the type by Hendel in 1911. The male is characterized by having a most extraordinarily developed head in the form of a slender cylinder, transversely placed, with eyes at the extremities. The head measures 11.5 mm. across, while the entire fly is but 8.5 mm. in length. The thickened, spinose, hind femora with the small, shallow, oval depression in the upper surface and the *Psila*-like wing fracture are characteristic features. The insect was collected by Dr. J. C. Bradley on May 31, 1924, along a trail near Soretka in a dense forest on a slope ascending the mountain ridge between two valleys.—O. A. JOHANSEN, Ithaca, N. Y.



TRAPPING FOR COLEOPTERA.

BY HERMAN C. MOENNICH, Little Neck, L. I., N. Y.

On June 3, 1933, I hung a pail baited with dissolved maple sugar in a forest near Alpine, N. J., to see what specimens could be thus collected in that locality. It was hung about six feet from the ground in a small oak tree.

The pail was visited about every two weeks and the catch taken therefrom. The variety of species taken were few, but the numbers of several of the rare species taken shows the importance of baiting if the collector wants to obtain a good census of the insects in a locality.

The first visit was made on June 10, when four specimens of *Colopterus maculatus*, Er., and one *Glishrochilus obtusus*, Sal., were taken from the pail; the last named species was not taken again until July 29th, when thirty-two specimens were found in the pail and again on August 12th, when eight were taken, making a total of forty-one specimens of what is considered quite a rare beetle.

Cryptarcha strigata, Fab., is considered fairly rare. Of this species five were taken on June 24 and were not taken again until August 12 when three were found, making a total of eight specimens.

My collecting by this method was short when some one deliberately took the pail from the tree and probably did away with it as it was not to be found in the locality. The last insects were taken from the pail on Aug. 12.

The following is a complete list of the insects collected in this way:—

SILPHIDAE

Silpha inaequalis Fab., July 29, 1933, 1 specimen.

PYROCHROIDAE

Neopyrochroa flabellata Fab., June 24, 1933, 2; July 29, 1933, 2; a total of 4.

ELATERIDAE

Hemicrepidius bilobatus Say, July 29, 1933, 1.

NITIDULIDAE

Colopterus maculatus Er., June 10, 1933, 5; July 2, 1933, 4; Aug. 12, 1933, 4; a total of 13.

Cryptarcha ampla Er., June 24, 1933, 5; July 2, 1933, 1; July 29, 1933, 7; Aug. 12, 1933, 10; a total of 23.

Cryptarcha strigata Fab., June 24, 1933, 5; Aug. 12, 1933, 3; a total of 8.

Glischrochilus obtusus Say, June 10, 1933, 1; July 29, 1933, 32; Aug. 12, 1933, 8; a total of 41.

CERAMBYCIDAE

Derobrachus brunneus Forst., Aug. 12, 1933, 1.

Leptura rubrica Say, July 12, 1933, 1.

Turpentine Orchards as a collecting ground for Coleoptera.

—During the summer months when the rosin is flowing freely from the recently blazed long leaf pines and the cups are filled with juice, these make prolific insect traps.

With a penknife and a pocket full of pill boxes the beetles, caught in flight like flies on tanglefoot, may be cut out rosin and all, or dipped out of the cups, filling and labelling box after box with specimens.

These boxes may be stored for an indefinite length of time until ready for cleaning and mounting, then the whole sticky mass is dissolved in spirits of turpentine, the specimens lifted out and given one or more baths in turpentine and a final bath in alcohol, dried on some absorbent paper until ready for pin or point.

Specimens treated this way are never subject to attack by pests or mold, the bane of all humid climate collections.

Many rare nightflying species have been taken this way such as: *Helluomorpha*, several species; *Scaphinus muticus*, *Cupes capitata*, *Zenoa*, *Cymatodera*, Elateridae, Buprestidae and a host of other insects, which ecologically belong in a pine forest.

Try the stunt sometime; it's a sticky, grimy job; but at all events your lunch won't give you any trouble, as in some collecting jobs I know of.—H. P. LÖDING, Mobile, Ala.

Disinfection of collections.—Sometimes collections, even in the Eastern United States, suffer from mold, not to mention *Anthrenus*. A French publication offers the following formula for disinfection: chloroform, 10 gms.; carbolic acid crystals, 5 gms.; beechwood creosote, 5 gms.; paradichlorobenzene, 5 gms.; oil of mirbane (nitrobenzene, or nitrobenzol), 79 gms.—J. R. T.—B.

MIRIDAE HERETOFORE UNRECORDED FROM INDIANA (HEMIPTERA).

LESTER I. MUSGRAVE,¹ Martinsville, Indiana.

Blatchley in his "Heteroptera of Eastern North America" records 148 species and varieties of Miridae as occurring in Indiana. Since then Blatchley (2)² has added two species and Knight (3, 4) one species and one variety, making a total of 152 species and varieties known from the state at present.

The writer has been making rather extensive collections of plant bugs in Indiana during the past two years and wishes at this time to record 20 species and varieties of mirids which have not been reported from the state before.

Dr. H. H. Knight, of Iowa State College, has examined all of the specimens upon which these records were based and has either named them for the writer or checked his determinations.

In addition to the species listed as new to the state, the writer has taken a series of 34 specimens of *Amblytylus nasutus* Kirschbaum from Lawrence and Morgan counties. This species was described by Blatchley (2) as *A. vanduzeei*, but Knight (5) showed that it is *A. nasutus*, a European species. This is the third time that this species has been reported from the United States.

The initials of the collector are placed in parentheses after the collection data. These collectors and their initials are: H. O. Deay—H. O. D., G. E. Gould—G. E. G., L. I. Musgrave—L. I. M., C. M. Packard—C. M. P., and A. W. Trippel—A. W. T.

MIRIDAE NEW TO INDIANA.

Platytyllus fraternus Knight, 1923. 1 specimen on willow, Morgan Co., June 21, 1932 (L. I. M.).

Phytocoris erectus Van Duzee, 1920. 1 specimen, Morgan Co., July 9, 1931 (L. I. M.); 1 specimen Lawrence Co., Aug. 21, 1932 (L. I. M.).

P. breviusculus Reuter, 1876. 1 specimen on Scotch pine, Sept. 21 (L. I. M. and H. O. D.), and 1 specimen at light, Sept. 25, 1932, Tippecanoe Co. (L. I. M.).

¹ Contribution from the Entomological Laboratories, Purdue University. The data used here were gathered by the writer during the preparation of his undergraduate thesis under the supervision of H. O. Deay.

² Numbers in parentheses refer to literature cited.

- Dichrooscytus viridicans* Knight, 1918. 71 specimens, on red cedar, Sept. 21, 1932 (L. I. M. and H. O. D.); 11 specimens, on red cedar, Oct. 13, 1932 (L. I. M.), Tippecanoe Co.
- Horcias dislocatus gradus* Knight, 1923. 1 specimen, Morgan Co., June 28, 1932 (L. I. M.).
- H. dislocatus nigriclavus* Knight, 1923. 1 specimen, Morgan Co., May 29, 1932 (L. I. M.).
- Capsus ater semiflavus* Linnaeus, 1758. 2 specimens, on dewberries, St. Joseph Co., June 15, 1932 (A. W. T.); 1 specimen, Tippecanoe Co., June 11, 1932 (L. I. M.).
- Neoborus canadensis* (Van Duzee, 1912). 1 specimen, Morgan Co., May 29, 1932 (L. I. M.).
- Ceratocapsus fasciatus* (Uhler, 1877). 1 specimen on wild grape, St. Joseph Co., Aug. 21, 1932 (A. W. T.).
- C. uniformis* (Knight, 1927). 1 specimen on elm, Lawrence Co., Aug. 2, 1932 (L. I. M.).
- Lopidea marginalis* (Reuter, 1909). 1 specimen, Clark Co., July 26, 1931; 1 specimen, Morgan Co., July 14, 1931 (L. I. M.).
- Diaphnidia pellucida* (Uhler, 1895). 1 specimen, Morgan Co., June 13, 1932 (L. I. M.).
- D. capitata* (Van Duzee, 1912). 3 specimens, on hickory and mulberry, Lawrence Co., Aug. 21, 1932 (L. I. M.).
- Orthotylus ornatus* (Van Duzee, 1916). 1 specimen, Kosciusko Co., May 25, 1932 (G. E. G.).
- O. modestus* (Van Duzee, 1916). 1 specimen, Morgan Co., June 20, 1931 (L. I. M.).
- Camptobrochis poccilus* (McAtee, 1919). 1 specimen, Tippecanoe Co., April 18, 1931 (L. I. M.).
- Plagiognathus delicatus* (Uhler, 1887). 2 specimens, Morgan Co., June 13, 1932 (L. I. M.).
- P. albifacies* (Knight, 1927). 1 specimen, Morgan Co., June 14, 1931 (L. I. M.).
- P. salicicola depallens* (Knight, 1929). 1 specimen, Elkhart Co., June 9, 1932 (G. E. G.).
- Campylomma verbasci* (Meyer, 1843). 1 specimen, Kosciusko Co., June 7, 1932 (G. E. G.).
- Labopidea allii* (Knight, 1923). 9 specimens, on onions, Posey Co., June 17, 1931 (C. M. P.); 1 specimen, St. Joseph Co., June 15, 1931 (A. W. T.). This is the most eastern record of this species.

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- North America with special reference to the faunas of Indiana and Florida. 1116 pp., 12 pls., 215 figs. Nature Publ. Co., Indianapolis, 1926.
2. Blatchley, W. S. Notes on the Heteroptera of Eastern North America with description of new species, I. *Jour. N. Y. Ent. Soc.* 36(1): 1-23. 1928.
 3. Knight, H. H. Notes on the species of *Polymerus* with description of four new species and two new varieties (Hemiptera, Miridae). *Canad. Ent.* 58(7): 164-168. 1926.
 4. Knight, H. H. Notes on the distribution and host plants of some North American (Hemiptera). *Canad. Ent.* 59(2): 34-44. 1927.
 5. Knight, H. H. An European plant bug (*Amblytylus nasutus* Kirschbaum) recognized from Massachusetts (Hemiptera, Miridae). *Ent. News* 41(8): 256-258. 1930.
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Memythrus fraxini Hy Edwards, a New Record for New York State:—This clearwing moth, originally assigned to the regions of the Rocky Mountains, in recent years has been captured and bred in numbers by Alex K. Wyatt, Emil Beer and V. G. Sasko in Illinois and Wisconsin. This is a borer in Virginia Creeper, *Ampelopsis quinquefolia*, the larva attacking the main roots several inches below the ground. Pupation takes place within the larval galleries and the moths appear in late July and during August. Cultural varieties of *Ampelopsis*, such as Boston Ivy, also are attacked.

The only previous Eastern record in the writer's collection is a male example collected by E. L. Bell at Ogdensburg, N. J., July 10, 1927.

Spring cleaning in a neighbor's garden here at Hartsdale, N. Y., revealed a long established infestation of this borer in the up-rooted, common *Ampelopsis*. A good series of living larvae are now held for breeding (April 23, 1934). After years of futile search for the insect, isn't it amazing to find it at one's very door!

The females of this species run uniformly alike throughout their range from West to East, but the males show a striking difference, those from the West having the primary wings wholly bronze-black, while the males from the Middle West and from the East have them with large transparent areas surrounding the discal mark. This difference has been recognized in the name *Memythrus fraxini* form *vitriosa*, restricted to the males from the Middle West and the East. GEO. P. ENGELHARDT, Hartsdale, N. Y. (April 15, 1934).

INSECTS OF THE BIBLE.

ROBT. E. BIRDSOING, Vallejo, California.

"All nature is a vast symbolism; every material fact has sheathed within it a spiritual truth."—E. H. Chapin.

"Go to the ant, thou sluggard; consider her ways and be wise: Which having no guide, overseer, or ruler, provideth her meat in the summer, and gathereth her food in the harvest."—Prov. vi. 6-8.

"The ants are a people not strong, yet they prepare their meat in the summer."—Prov. xxx. 25.

Ants feed on flesh, insects, and saccharine matter from trees. They store up corn, chaff, seeds and the like only to protect their nests from the damp. However, there is no denying that they surpass most insects in instinct and industry. There have been several of the genus *Formica* taken in the vicinity of Palestine.

"They compassed about me like bees; &c. . . ."—Ps. cxviii. 12.

There are in abundance the hive bees of England, and even more those of southern Europe. The allusions in the Scripture, however, are mainly to the wild bees, which attack plunderers with great fury. "And the Amorites, which dwelt in that mountain, came out against you, and chased you, as bees do, and destroyed you in Seir, &c."—Deut. i. 44.

The abundance of bees is certified by the term descriptive of Palestine, "flowing with milk and honey." "And all they of the land came to a wood; and there was honey upon the ground."—I Sam. xiv. 25.

The climate and the aromatic flora of Palestine are peculiarly adapted for this particular insect. They are most numerous in the wilderness of Judaea, and they are also found in Assyria. ". . . and for the bee that is in the land of Assyria."—Is. vii. 18.

Honey was one of the delicacies sent by Jacob to Egypt, and a commodity supplied by Judah to the market at Tyre. "And the same John had his raiment of camel's hair, and a leathern girdle about his loins; and his meat was locusts and wild honey."—Mat. iii. 4.

I have been able to locate two species of the latter insect recorded for the district of Palestine; namely, *Apis mellifica* and *A. ligustica*.

"For the stone shall cry out of the wall, and the beam out of the timber shall answer it."—Hab. ii. 11.

There seems to be some doubt as to the translation from the Hebrew of the word Chaphis. Gesenius and others translate the word "beam." In the above verse, Bochart, in his translation, renders Chaphis as "the scarabaeus," or sacred beetle of Egypt. The Jews were familiar with this insect. To the Egyptians it was an emblem of eternity and resurrection. (See Hope, in Trans. Entom. Soc., ii, 173.)

"Come now, and let us reason together, saith the Lord: though your sins be as scarlet, they shall be as white as snow; though they be red like crimson, they shall be as wool."—Is. i. 18.

Tolaath, the Hebrew of Cochineal, is always translated by "Crimson" or "scarlet." It is literally the "crimson worm" (Arab. Kermez), but the latter word is omitted, because in the text the color, not the insect is denoted. The insect, *Coccus ilicis*, is a cochineal, attaching itself to the Syrian holm-oak. The male is winged, the female wingless; and it is from the latter alone that the dye is gained. It is a dark red. The insect is about the size of the kernel of a cherry, but on drying it shrinks smaller than a wheat grain. The insect is very abundant in Palestine, though supplanted as a dye by the imported Mexican species, which feeds on the prickly pear.

"After whom is the king of Israel come out? after whom dost thou pursue? after a dead dog, after a flea."—Sam. xxiv. 20.

"Now therefore, let not my blood fall to the earth before the face of the Lord; for the king of Israel is come out to seek a flea, as when one doth hunt a partridge in the mountains."—Sam. xxvi. 20.

The flea is mentioned only in the two preceding verses, as an illustration of the most insignificant of creatures. That is hardly to be denied. Fleas, *Pulex irritans*, swarm in the very sand of Egypt, and in the dust of all parts of Palestine, the greatest pests of man and beast.

"And the Lord said unto Moses, Say unto Aaron, Stretch out thy rod, and smite the dust of the land, that it may become lice throughout all the land of Egypt."—Ex. viii. 16.

Lice are only mentioned in the record of the Egyptian plague, and the Hebrew name is thought to be of Egyptian origin. Some contend that "gnats" or "mosquitoes" are meant; but the latter spring from water, not from dust as stated in the preceding verse. Parasitic insects abound in the East, and through the summer the Mohammedan men keep their heads shorn to avoid them.

"Else, if thou wilt not let my people go, behold, I will send swarms of flies upon thee, and upon thy servants, and into thy houses: and the houses of the Egyptians shall be full of swarms of flies and also the ground whereon they are."—Ex. viii. 21. . . . "He sent divers sorts of flies among them, which devoured them; and frogs which destroyed them."—Psalms lxxviii. 45.

Arob (Jewish) occurs of the plague of flies in Egypt. It is disputed whether the common house fly or mosquito is meant. Both are great pests in Egypt now, as also are the gad-fly and the horse-fly (*Musca*). The common fly carries the poison of ophthalmia from man to man, and spreads its infection. The reference here is probably generic, including in the "plague of swarms," flies, sandflies, gnats, mosquitos and other members of the related families.

"Dead flies cause the ointment of the apothecary to send forth a stinking savour; . . ."—Eccles. x. 1.

". . . the Lord shall hiss for the fly that is in the uttermost part of the rivers of Egypt, . . ."—Is. vii. 25.

Zebub (Jew.) is only mentioned in the above verses. The former is probably a gad-fly tormenting horses on the banks of the Nile or Jordan, incidently so pestiferous as to be deprecated by appeals to a special god, Baalzebub (of Ekron), whom the Jews derisively called "lord of the dunghill" (Baal-zebel). Probably the poisonous Tsetse, described by Livingstone, is meant. The other reference would be to the common fly, whose swarms would corrupt any unguent or savory compote in a few minutes.

"Ye blind guides which strain at a gnat, and swallow a camel."—Mat. xxiii. 24.

The only reference to the gnat is found in the former verse, where the proper rendering is "strain out a gnat," a metaphor from the custom of straining wine before drinking. This was done to avoid a breach of ceremonial law, as hinted in the following verses:

"Yet these may ye eat of every flying creeping thing that goeth upon all fours, which have legs above their feet, to leap withal upon the earth," and "And every creeping thing that creepeth upon the earth shall be an abomination; it shall not be eaten."—Lev. xi. 21 & 41.

Gnats (*Culex*) and mosquitos are among the most prevalent pests of Egypt and Palestine, frequenting all marshy ground.

Hornets (Ex. xxiii. 28) were abundant in Palestine, as indicated by the name of the valley of Zoreah (Josh. xv. 35)—"the

place of hornets." The Bible phraseology betokens the dread with which they were regarded; but it is conjectured that God's promise to drive out the Canaanites before Israel was metaphorical of a panic, or of the preceding plague generally, since no mention occurs in the Pentateuch of any such visitation of hornets. Four species (*Vespa crabro*, &c.) resembling ours, but larger, have been found there.

The "Locust" (Ex. x. 4-6. Lev. xi. 22) includes the insects called in late versions by the different names: Beetle, Canker-worm, Caterpillar, Grasshopper, Locust, Bald-locust and Palmer-worm. The Rabbis say there were 800 species, but only about forty have been identified in Palestine. Its name, habits, ravages, appearances, &c., are constantly mentioned in Scripture. Nine Hebrew words are used to express the locust species:

1. Arbeh—Used of the Egyptian plague. (Above verses.)
2. Salam—Probably *Truxalis* (Lev. xi. 22). The word is more than likely of Chaldean origin.
3. Chargol—Occurs once as an edible, clean species. (Lev. xi. 21-22.) Rendered "beetle."
4. Chagob—Generally translated "grasshopper." From a comparison of texts it is gathered that it was the smallest of destructive locusts.
5. Gazem—The palmer-worm. (Joel i. 4.)
6. Yelek—The canker-worm. (Joel i. 4. Nah. iii. 15. Jer. li. 14, 27.)
7. Tzelatzal—Means the "tinkler"; applied to the locust from the noise of its wings. (Deut. xxviii. 42.)
8. Gob—Translated locust and grasshopper. (Is. xxxiii. 4 and Amos vii. 1.)
9. Chasil—Translated caterpillar, though always included in passages with locusts.

The references to the moth in Scripture allude to the destruction of cloths by its larvae, and it is cited as a mark of the perishable nature of temporal things, and the folly of the prevalent eastern custom of hoarding costly raiment. In Job xxvii. 18, "buildeth his house as a moth," reference is made to some leaf rolling larvae. The moth is the only one of the Lepidoptera mentioned in Scripture; but 280 species of this genus have been found, though the climate and absence of wood are unfavorable to butterflies and moths.

Annexed to the Teacher's Edition of the Oxford Bible is a guide to the study of the Bible. Contained in this are historical, chronological and geographical tables; lists of animals, birds, insects, plants, minerals, &c., found in Scriptures. From this list and its cross references, I have gained all that is contained in the foregoing article. I found the subject to be most interesting and instructive, and I present it to the reader hoping that he may derive as much from it as I did.

THE FIRST TYPE FIXATION FOR *CIMEX* LINNAEUS.

H. G. BARBER, Bureau of Entomology, U. S. Department of Agriculture.

As the first true genotype designation for *Cimex* Linnaeus by Latreille in 1803 has been overlooked in Opinion 81 of Opinions Rendered by the International Commission on Zoological Nomenclature,¹ and by various authors who have discussed the question, I quote verbatim from the Nouveau Dictionnaire d'Histoire Naturelle (Paris) XVIII, 1803, p. 577, as follow:

"PUNAISE, *Cimex*, genre d'insectes de l'ordre des Hémiptères et de ma famille des CIMICIDES. Ayant converti en famille le genre *cimex* de Linnaeus, il étoit naturel de conserver la dénomination de PUNAISE, *Cimex*, à l'insecte malheureusement trop connu qui porte ce nom. Il m'a paru ridicule de voir appeler *achanthie* ce que tout le monde nomme *punaise*. Le genre dont je traite ici a donc pour type la *punaise des lits* (*acanthia lectularia* Fab.). Les *cimex* du célèbre entomologiste de Kiell répondront à nos genres PENTATOME et SCUTELLÈBE [sic]". . . .

The next to the last sentence as translated reads: The genus which I have treated here has therefore for type the bed bug.

There can be no question that this is a valid type fixation, which, fortunately, does not alter the opinion of the Commission of the International Code that *Cimex* must be retained for *lectularius* Linn.

¹ Smithsonian Miscellaneous Collections, volume 73, number 2 (Publication 2747). February 9, 1924.

AN ANNOTATED LIST OF THE FULGORIDAE (HOMOPTERA) OF INDIANA.*

ROBERT R. HEATON, Rushville, Indiana.

As no work had been done on the Fulgoridae in Indiana, the writer collected the insects of this group and studied them with much additional state material in order to discover what species are common to the State. This preliminary work has established the following list of 34 species and one variety of which only six have been heretofore recorded.

In this list the initials in parentheses are for the following collectors to whom thanks are due for furnishing specimens with valuable records: J. J. Davis (J. J. D.), H. O. Deay (H. O. D.), G. E. Gould (G. E. G.), P. W. Mason (P. W. M.), B. E. Montgomery (B. E. M.), L. I. Musgrave (L. I. M.), L. F. Steiner (L. F. S.), and A. W. Trippel (A. W. T.). Records on insects taken from student collections are denoted by (P. C.) and the writer's by (R. R. H.).

The writer wishes to express his appreciation to Dr. E. D. Ball, University of Arizona, for the checking and correcting of all identifications, and to H. O. Deay, Purdue University, for his guidance in this study.

The following species are arranged according to Van Duzee's catalogue (1),¹ although Doctor Ball's nomenclature has been retained. The county is taken as the unit for collection records.

Subfamily DICTYOPHORINAE.

Scolops Schaum.

1. *Scolops sulcipes* (Say, 1825).

Collection records: Clark Co., July 8, 1932 (P. C.); Knox Co., August 30, 1929 (B. E. M.); Kosciusko Co., August 7, 1932 (G. E. G.); Lawrence Co., July 13, 20, 27, 1932 (L. I. M.), 25, 1931 (B. E. M.), August 2, 21, 1932 (L. I. M.), 21, 1930 (H. O. D.); Morgan Co., July 13, 1931 (R. R. H.); Porter Co., August 10, 22, 1931 (J. J. D.); Pulaski Co., July 24, 1932 (R. R. H.); Rush Co., July

* Contributions from the Entomological Laboratories, Purdue University. The data contained herein were compiled during the preparation of the writer's undergraduate thesis.

¹ Numbers in parentheses refer to literature cited.

18, 1932 (R. R. H.); Starke Co., July 24, 1932 (G. E. G.); St. Joseph Co., July 12, August 11, 1932 (A. W. T.); Tippecanoe Co., July 11, 13, 1932 (B. E. M.), August 21, 1932 (H. O. D.), 21, 1932 (G. E. G.), October 1, 1932 (R. R. H.); White Co., July 24, 1932 (G. E. G.).

Seasonal range: July 8–October 1.

Notes: This species was taken from sweeping the following plants: corn, dewberry, and goldenrod. Specimens were also collected in fruit orchards and from weeds along river banks. This is a new record for Indiana.

2. *Scolops pungens* (Germar, 1830).

Collection records: Kosciusko Co., August 8, 1932 (G. E. G.); Lawrence Co., July 13, 20, 27, 1932 (L. I. M.), August 1, 2, 1932 (L. I. M.), 27, 1931 (B. E. M.), 30, 1927 (L. F. S.); Morgan Co., July 14, 1931 (L. I. M.); St. Joseph Co., August 11, 1932 (A. W. T.); Tippecanoe Co., July 2, 1932 (G. E. G.), 11, 1932 (B. E. M.), 19, 20, 1932 (A. W. T.), 21, 25, 1932 (H. O. D.), August 10, 1932 (H. O. D.), 14, 1914 (J. J. D.); White Co., July 24, 1932 (G. E. G.).

Seasonal range: July 2–August 30.

Notes: Hosts from which taken: apple, asparagus, clover, corn, pine, and willow. A few specimens were taken in orchard sweepings. This species is recorded from Indiana in Van Duzee's catalogue (1).

3. *Scolops angustatus* Uhler, 1876.

Collection records: Clark Co., July 14, 1931 (P. C.); Lawrence Co., July 13, 20, 27, 1932 (L. I. M.), 25, 1931 (B. E. M.), August 2, 9, 1932 (L. I. M.), 21, 1930 (H. O. D.), 29, 1927 (L. F. S.), September 21, 1927 (L. F. S.); Rush Co., July 18, 1932 (R. R. H.).

Seasonal range: July 13–September 21.

Notes: Taken from dogwood and by sweeping fruit orchards and swamp weeds. Van Duzee (1) records this species from Indiana.

Phylloscelis Germar.

4. *Phylloscelis atra* Germar, 1839.

Collection records: Knox Co., August 8, 1929 (B. E. M.); Lawrence Co., August 29, 1927 (L. F. S.).

Notes: This is a new Indiana record.

Subfamily ACHILINAE.

Elidiptera Spinola.

5. *Elidiptera opaca* (Say, 1830).

This species was described from Indiana by Say (2); but the writer has seen no specimens which have been collected from Indiana.

Catonia Uhler.

6. *Catonia nava* Say, 1830.

Collection records: Crawford Co., September 1, 1925 (J. J. D.); Tippecanoe Co., September 26, 1931 (R. R. H.).

Notes: A single specimen was taken from sweeping weeds in a swampy wood-lot. Say (2) described this species from Indiana in 1830.

7. *Catonia pumila* Van Duzee, 1908.

Collection record: Lawrence Co., August 22, 1932 (L. I. M.).

Notes: This is a new record for Indiana.

Subfamily CIXIINAE.

Oliarus Stål.

8. *Oliarus placitus* Van Duzee, 1912.

Collection records: Jefferson Co., July 13, 1932 (P. C.); Tippecanoe Co., July 19, 1932 (A. W. T.).

Notes: The two specimens were taken from blackberry.

Doctor Ball states that this determination is rather doubtful since the record is a wide departure in the distribution of a southern form. This is a new record for Indiana.

9. *Oliarus aridus* Ball, 1902.

Collection records: Owen Co., 1921 (J. J. D.).

Notes: Another doubtful determination according to Doctor Ball. This is a new record for Indiana.

10. *Oliarus humilis* (Say, 1830).

Collection records: Lawrence Co., August 13, 1932 (L. I. M.).

Notes: This is a new record for Indiana.

Pintalia Stål.

11. *Pintalia aspersa* Fowler, 1904.

Collection records: Rush Co., July 7, 1931, 18, 1932 (R. R. H.).

Notes: Two specimens were taken while at rest on young ash. Another was collected from sweeping swamp weeds. This is a new Indiana record.

Cixius Latreille.

12. *Cixius basalis* Van Duzee, 1908.

Collection records: Porter Co., September 1, 1925 (P. C.); Morgan Co., June 28, 1932 (L. I. M.), July 14, 1931 (R. H.); Porter Co., August 11, 1931 (J. J. D.).

Seasonal range: June 28–September 1.

Notes: This is a new Indiana record.

13. *Cixius stigmatus* (Say, 1825).

Collection records: Morgan Co., October 10, 1931 (L. I. M.); Tippecanoe Co., September 21, 1931 (P. C.), 22, 1932 (L. I. M.), October 1, 1932 (R. R. H., L. I. M.).

Notes: Taken by sweeping clover, potatoes, and roadside weeds. This is a new Indiana record.

Myndus Stål.

14. *Myndus pictifrons* Stål, 1862.

Collection records: Tippecanoe Co., July 10, 1922 (J. J. D.).

Notes: This is a new Indiana record.

Subfamily ISSINAE.

Fitchiella Van Duzee.

15. *Fitchiella robertsoni* (Fitch, 1856).

Van Duzee (1) records this species from Indiana but the writer has seen no specimens from this State.

Thionia Stål.

16. *Thionia bullata* (Say, 1830).

Collection records: Clark Co., July 12, 1931 (P. C.); Crawford Co., August 30, 1926 (J. J. D.); Lawrence Co., August 21, 1932 (L. I. M.); Morgan Co., July 14, 1931 (R. H.).

Notes: Taken on dogwood and from river weeds. This is a new record for Indiana.

Subfamily ACANALONIINAE.

Acanalonia Spinola.

17. *Acanalonia bivittata* (Say, 1825).

Collection records: Bartholomew Co., October 15, 1932 (H.

O. D.) ; Clark Co., July 22, 1931 (P. C.) ; Crawford Co., August 30, 1926 (J. J. D.) ; Knox Co., August 8, 1929 (B. E. M.) ; Kosciusko Co., August 7, 1932 (G. E. G.) ; Lawrence Co., July 13, 20, 1932 (L. I. M.), August 2, 4, 9, 21, 29, 1932 (L. I. M.), 29, 1930 (H. O. D.), September 1, 1927 (L. F. S.) ; Morgan Co., October 10, 21, 1931 (L. I. M.) ; Porter Co., August 22, 1931 (J. J. D.) ; St. Joseph Co., August 21, 22, 1932 (A. W. T.) ; Starke Co., July 24, 1932 (G. E. G.) ; Tippecanoe Co., June 11, 1932 (L. I. M.), July 5, 1922 (J. J. D.), 11, 1922 (P. C.), 19, 20, 1932 (A. W. T.), 22, 1932 (G. E. G.), 25, 1932 (H. O. D.), August 10, 1932 (H. O. D.), 15, 1932 (P. C.), September 7, 1932 (H. O. D.), 13, 1932 (A. W. T.), 22, 25, 28, 1931 (L. I. M.), 22, 28, 1931 (P. C.), 25, 1931 (R. R. H.), October 1, 1932 (R. R. H.).

Seasonal range: June 11–October 21.

Notes: Taken from the following plants: apple, ash, blackberry, black-eyed Susan, clover, corn, cottonwood, dewberry, goldenrod, locust, soft maple, milkweed, morning glory, and ragweed. Specimens were also swept from orchards, undergrowth in woods, and weeds in marshes. This is a new Indiana record.

17a. *Acanalonia bivittata* variety *rubescens* (Melichar, 1901).

Collection records: Lawrence Co., July 20, 1932 (L. I. M.), August 21, 28, 1930 (H. O. D.), 30, 1927 (L. F. S.) ; Tippecanoe Co., May 26, 1929 (P. C.), September 22, 1931 (L. I. M.).

Notes: Captured in codling moth bait traps and swept from marsh weeds. This is a new Indiana record.

18. *Acanalonia conica* (Say, 1830).

Collection records: Daviess Co., June 25, 1921 (J. J. D.) ; Knox Co., August 8, 1929 (B. E. M.) ; Kosciusko Co., July 24, 1932, August 7, 1932 (G. E. G.) ; Lawrence Co., August 9, 1932 (L. I. M.) ; Morgan Co., July 14, 1931 (R. R. H.) ; Rush Co., July 18, 1932, September 11, 1931 (R. R. H.) ; St. Joseph Co., July 25, 1932, August 22, 1932 (A. W. T.) ; Tippecanoe Co., July 11, 1922 (P. C.), 19, 1932 (B. E. M., A. W. T.), August 21, 1932 (H. O. D.).

Seasonal range: June 25–September 11.

Notes: Taken from dogwood, goldenrod, locust, and weeds along river and swamp. Say (2) described this species from Indiana in 1830.

Subfamily FLATINAE.

Ormenis Stål.19. *Ormenis pruinosa* (Say, 1830).

Collection records: Cass Co., July 1, 1932 (H. Ramsey); Crawford Co., August 30, 1926 (J. J. D.); Daviess Co., June 25, 1921 (J. J. D.); Jefferson Co., July 26, 1932 (P. C.); Knox Co., August 22, 1924 (B. E. M.); Kosciusko Co., July 21, 1932 (G. E. G.); Lawrence Co., July 20, 1932, August 2, 21, 1932 (L. I. M.), 28, 1930 (H. O. D.); Morgan Co., June 19, 1931 (L. I. M.), July 13, 1931 (R. R. H.), August 28, 1932, September 17, 28, 1932 (L. I. M.); Parke Co., August 28, 1932 (G. E. G.); Porter Co., August 11, 22, 1931 (J. J. D.); Rush Co., July 18, 1932 (R. R. H.); St. Joseph Co., July 25, 1932, August 22, 1932 (A. W. T.); Tippecanoe Co., June 11, 1932 (L. I. M.), 24, 1932, 25, 1931 (P. C.), July 10, 1932 (A. W. T., B. E. M.), 17, 1922 (P. C., P. W. M.), 19, 20, 1932 (A. W. T.), 22, 1932 (G. E. G.), 31, 1932 (H. O. D.), August 15, 1932 (P. C.), 21, 1932 (G. E. G., H. O. D.), September 22, 1931, 29, 1932 (L. I. M.), 28, 1924, October 5, 1931 (P. C.).

Seasonal range: June 11–October 18.

Notes: Taken from water beech, blackberry, corn, dogwood, hickory, mulberry, red oak, poplar, willow, and marsh weeds. This is a new record for Indiana.

20. *Ormenis venusta* Melichar, 1902.

Collection records: Lawrence Co., July 13, 1932, August 21, 1932 (L. I. M.); Morgan Co., August 28, 1932 (L. I. M.); Tippecanoe Co., November 20, 1932 (P. C.).

Seasonal range: July 13–November 20.

Notes: This is a new record for Indiana.

21. *Ormenis septentrionalis* (Spinola, 1839).

Collection records: Jefferson Co., August 8, 1932 (P. C.); Lawrence Co., August 16, 21, 1932 (L. I. M.); Pulaski Co., August 5, 1932 (R. R. H.); Rush Co., September 24, 1932 (R. R. H.); St. Joseph Co., August 22, 1932 (A. W. T.); Tippecanoe Co., June 11, 1931 (P. C.), July 17, 1922, 20, 1932 (P. C.), 20, 1932 (A. W. T.), 26, 1932 (A. W. T., B. E. M.), August 21, 1932 (H. O. D.), September 22, 1931, 25, 1932 (L. I. M.), October 3, 18, 1930 (P. C.).

Seasonal range: June 11–October 18.

Notes: Taken by sweeping ash, corn, elm, wild grape, honey locust, maple, sycamore, willow, and marsh weeds. This is a new record for Indiana.

Subfamily DERBINAЕ.

Cedusa Fowler.

22. *Cedusa kedusa* McAtee, 1924.

Collection records: Kosciusko Co., July 8, 1932 (G. E. G.); Rush Co., July 13, 1932 (R. R. H.); Tippecanoe Co., July 12, 1932 (B. E. M.), 16, 23, 1932 (H. O. D.).

Notes: Taken on elm, hickory, and by sweeping swamp weeds. This is a new record for Indiana.

Amalopota Van Duzee.

23. *Amalopota uhleri* Van Duzee, 1889.

Collection record: Crawford Co., August 30, 1926 (J. J. D.).

Notes: This is a new record for Indiana.

Anotia Kirby.

24. *Anotia burnetii* Fitch, 1856.

Collection records: Rush Co., September 24, 1932 (R. R. H.).

Notes: Taken by sweeping weeds in moist lowlands. This is a new record for Indiana.

Apache Kirkaldy.

25. *Apache degeerii* (Kirby, 1819).

Collection records: Lawrence Co., August 21, 1932 (L. I. M.); Tippecanoe Co., June 27, 1912 (J. J. D.).

Notes: Taken on maple. This is a new record for Indiana.

Otiocerus Kirby.

26. *Otiocerus abbotii* Kirby, 1819.

Collection records: Tippecanoe Co., July 12, 13, 1932 (B. E. M.), 14, 1932 (H. O. D.).

Notes: Taken on hickory and maple. This is a new record for Indiana.

27. *Otiocerus coquebertii* Kirby, 1819.

Collection records: Clark Co., June 13, 1932 (B. E. M.).

Notes: This is a new record for Indiana.

Subfamily DELPHACINAE.

Stenocranus Fieber.

28. *Stenocranus dorsalis* (Fitch, 1851).

Collection records: Rush Co., July 3, 1932 (R. R. H.).

Notes: Taken by sweeping shrubs. This is a new record for Indiana.

Stobaera Stål.

29. *Stobaera tricarinata* (Say, 1825).

Collection records: Bartholomew Co., October 15, 1932 (G. E. G.); Marion Co., October 15, 1932 (H. O. D.); Morgan Co., July 13, 1931 (R. R. H.), 14, 1931 (L. I. M.), November 7, 1932 (L. I. M.); Rush Co., September 17, 1932 (R. R. H.); Tippecanoe Co., August 11, 1932 (P. C.), September 10, 1932 (H. O. D.).

Seasonal range: July 13–November 7.

Notes: Taken on clover, corn-field weeds, and river-bank weeds. This is a new record for Indiana.

Liburniella Crawford.

30. *Liburniella ornata* (Stål, 1862).

Collection records: Morgan Co., November 7, 1932 (L. I. M.); Rush Co., September 17, 1932 (R. R. H.); Tippecanoe Co., October 7, 1932 (H. O. D.), 8, 1932 (G. E. G.).

Notes: Taken from weeds in cornfield. This is a new record for Indiana.

Liburnia Stål.

31. *Liburnia puella* Van Duzee, 1894.

Collection records: Morgan Co., November 7, 1932 (L. I. M.); Rush Co., June 12, 1932 (R. R. H.).

Notes: This is a new record for Indiana.

32. *Liburnia basivitta* Van Duzee, 1909.

Collection records: Rush Co., September 24, 1932 (R. R. H.).

Notes: Swept from grass in swamp. This is a new record for Indiana.

Delphacodes Fieber.

33. *Delphacodes osborni* (Van Duzee, 1894).

Collection records: Tippecanoe Co., September, 1912 (P. C.).

Notes: This is a new record for Indiana.

Pentagramma Van Duzee.

34. *Pentagramma vittatifrons* (Uhler, 1878).

Collection records: Porter Co., September 1, 1925 (B. E. M.).

Notes: This is a new Indiana record.

REFERENCES CITED.

1. Van Duzee, E. P. Catalogue of the Hemiptera of America North of Mexico excepting the Aphididae, Coccidae, and Aleurodidae. Univ. Calif. Publ., Tech Bul. 2: 1-902. 1917.
2. Say, Thomas. Descriptions of new North American Hemipterous insects, belonging to the first family of the section Homoptera of Latreille. Jour. Acad. Nat. Sci. Phila. 6: 235-244. 1830.

The Winter of 1933-34, and Insect Occurrence:—With the Spring season retarded well into April, we are wondering what effect the unusually severe winter just past has had upon our most obnoxious insect pests of garden and woodlands here in the East.

The Fall and the Spring Cankerworms again should prove a serious problem, judging by the number of moths about in early winter and early spring. The tent caterpillar, *Malacosoma americana*, will be a greater nuisance than it has been in many years. The little white tents between the forks of branches in orchards and along hedgerows are forming now. If people only would take advantage of the habits of these caterpillars to gather in colonies under the tents during the day, simple crushing of the contents of each tent would prevent much trouble later on.—GEO. P. ENGELHARDT, Hartsdale, N. Y.

Some interesting State Noctuid Records from the State Museum:—

Philometra hanhami Sm. 1 ♀ Wells, N. Y., July 30, 1916; 1 ♀ Center, N. Y. July 14, 1879 (W. W. Hill Coll.); 1 ♀ Lewis Co., N. Y. July —, 1880 (W. W. Hill Coll.).

Bleptina medialis Sm. Albany, N. Y., June 1882 (W. W. Hill Coll.) New to state list.

Syngrapha devergens Hbn. Plattsburgh, N. Y., July 21, 1893 (G. H. Hudson Coll.). First record of this genus for the state.

Apatela lanceolaria Grt. Newport, N. Y., May 21, 1902. New to state list.

Eriopus floridensis Gn. Two specimens bred from pupae, Lockport, N. Y., July 5, 1916. Probably an importation of this southern species.—A. GLENN RICHARDS, JR., Rochester, N. Y.

REPORT OF THE PUBLICATION COMMITTEE OF
THE BROOKLYN ENTOMOLOGICAL
SOCIETY FOR 1933.*

With the completion of volume XXVIII of the BULLETIN, our publication attained its majority—this is the twenty-first volume published since we resumed publication with vol. VIII in 1912. It also rounds out the present Editor's twenty-first year on the Publication Committee and his fifteenth year as Editor. It therefore seems fitting at this time to depart from the formal stated report of progress and to consider historically the intervening years.

The first number of the BULLETIN OF THE BROOKLYN ENTOMOLOGICAL SOCIETY appeared under May date in 1878. Its subscription price was 60c. per year. This first number had 8 pages, including one page of advertisements, and 8 additional pages, both parts consecutively numbered from page 1 to page 8; in fact, these were *two* complete May numbers, separately paged and not identical. The first Editor was F. G. Schaupp. This first volume ran to 96 plus 8 pages. The last volume of the original BULLETIN was vol. VII, under the editorship of John B. Smith. Its last number was for March and April, 1885, with 85 pages; the whole volume ran to 160 pages. The BULLETIN was then discontinued and merged with PAPILIO to form ENTOMOLOGICA AMERICANA. The last named endured 6 years, a continued life for the publication under two names, of 13 years, after which the Society went into hibernation until 1900, when it once more resumed activity.

In 1912, 22 years ago, the BULLETIN was revived. The first number was for October of that year—no. 1, vol. VIII. This volume ran to 7 numbers, to bring the volumes to coincide with the calendar year. The next volume, vol. IX, began with the number for February, 1914, as no. 1. From that time to this date we have published five numbers each year.

Volume VIII had for its first Editor Mr. Charles L. Pollard; the other members of the Publication Committee being Mr. C. Schaeffer and Mr. Robert P. Dow, then our Secretary. Mr. Pollard resigned in February, 1913, after getting out the first two numbers of vol. VIII. He was succeeded on the Committee by Mr. J. R. de la Torre-Bueno on February, 13, 1913, twenty-one years ago at this time. Mr. R. P. Dow took over the editorship succeeding Mr. Pollard. Mr. Bueno assisted Mr. Dow in various

* Read at the February, 1934, meeting of the Society.

minor editorial matters, mainly in soliciting advertisements. In November, 1918, because of failing health, Mr. Dow resigned the editorship, after five years of service. The present Editor took charge with the number for December, 1918. With the completion of vol. XXVIII, for 1933, he has rounded out 15 years as Editor of the BULLETIN and later of ENTOMOLOGICA AMERICANA and of the 3rd edition of the GLOSSARY. The new BULLETIN has now attained its majority, having been in continuous publication for over twenty-one years.

The first personnel of the Publication Committee lasted until Mr. Dow's resignation, when Mr. George P. Engelhardt was elected to the Committee at the Annual Meeting on January 16, 1919; which position he has held for the 15 years since. At the February 13 meeting following, Dr. Jos. Bequaert, as Secretary, under the By-Laws replaced Mr. Schaeffer. The Committee thus made up lasted for 7 years, until 1924, when Dr. Bequaert moved to Boston. He was replaced by Mr. E. L. Bell, the Secretary, followed in turn in 1931 by Mr. C. G. Siepmann, our present Secretary. Our Publication Committee has had in the twenty-one years since it was reestablished the following members:

Charles L. Pollard, Editor, 1912 (2 months).

Robert P. Dow, Editor, 1913-1919.

J. R. de la Torre-Bueno, 1913-1919; Editor, 1919-1933.

Charles Schaeffer, 1912-1919.

George P. Engelhardt, 1919-1933.

Dr. Jos. Bequaert, 1919-1926.

E. L. Bell, 1927-1930.

Carl Geo. Siepmann, 1931-1933.

These twenty-one years have witnessed growth and change; when our BULLETIN once more saw the light in 1913, we were financially poor, even though rich in enthusiastic and devoted members, a riches that have always been our strength and our mainstay.

The first volume of our new series, vol. VIII, ran to 7 numbers with a total of 128 pages, plus 6 pages of index; it contained 44 articles of varying lengths, mostly short, together with 8 short notes, with the addition of the Proceedings of the Society. The following volumes naturally varied in pages and contents thus: vol. IX, 111 pp.; vol. X, 112 pp.; vol. XI, 115 pp.; vol. XII, 130 pp.; vol. XIII, 130 pp.; vol. XIV, 153 pp.; vol. XV, 159 pp.; vol. XVI, 150 pp.; vol. XVII, 161 pp.; vol. XVIII, 184 pp.; vol. XIX, 209 pp.; vol. XX, 242 pp.; vol. XXI, 217 pp.; vol. XXII, 306 pp.; vol. XXIII, 296 pp.; vol. XXIV, 358 pp.; vol. XXV, 321 pp.; vol. XXVI, 282 pp.; vol. XXVII, 261 pp.; vol. XXVIII, 248 pp. This

gives a total of 4,273 pages published in 21 years. Our subscription price to non-members has ranged from 75c. per year at the start to \$2.50 a year now. Our first BULLETIN cost us 50 cents per page; we now pay \$2.75—or, comparatively, it costs us today nearly six times as much as at the beginning, but we only charge a little over three times as much, even though we have given more than three times as many pages as at the beginning; and even now, we give at least twice as many pages.

During this period, our indices have carried some 13,000 specific names, about 1,000 of them being those of species newly described in the BULLETIN.

In 1926 we revived *Entomologica Americana* with vol. VII; we have just completed vol. XIII. Here we have published some 1,795 pages. We do not dilate on this publication, except to point out that in the last 21 years, the Society has published in its two journals over 6,000 pages of matter, most of it interesting and a good part—perhaps one half—of lasting value.

We have also published two editions, or reprintings, of Smith's *Glossary*; and we have in active preparation a third edition, revised and brought to date.

Our original subscription list carried some 50 names, mostly members of the Society. In spite of the cruel losses sustained because of the depression, we have at this date nearly six times as many paying subscribers to the BULLETIN; *Entomologica Americana*, being a highly specialized journal, has only about half as many subscribers.

Financially, our publications have shown an increasing return. An early report of the Treasurer (1919) showed special contributions to the publication from members, to the amount of \$50. We have had none such since. In 1926, Mr. Wm. H. Nichols, Jr., contributed the sum of \$500 toward enlarging the publications—namely, toward *Entomologica Americana* and the last printing of the *Glossary*. Our peak of income was reached in 1932, during the depression, when our Treasurer handled over \$3,500 from our publications.

What does the future hold in store for our publications? No man can tell; but if we were able to weather the World War and its great dislocation of all activities, we can certainly survive present adverse conditions.

A rigid pruning of subscription lists and careful collection of resources has shown a relatively small net loss; new subscriptions still continue to come in, even though in no great numbers. We

have thus far met our costs; and we are trimming our journals to correspond to our income. Our chief and real asset is the friendly good-will of our subscribers and authors, which has always been sedulously cultivated both by the Editor and the Treasurer.

As to material for our publications, we have enough MSS. of high quality on hand practically for the remainder of this year for the BULLETIN and for vol. XIV of *Entomologica Americana*—those for the latter being of unusual excellence.

The preparation of the new, enlarged and improved *Glossary* is about to enter the final stages of activity. This publication has always yielded a steady income and has been a source of prestige to the Society.

In short, portents are favorable; and with the unfailing support and loyalty of the Society, your Publication Committees, present and future need have no fearful anticipations. Rather should we look forward all together to continued fruitful effort for our science of entomology at large; and in particular for our Society.

Respectfully submitted,

J. R. DE LA TORRE-BUENO, *Editor*

GEO. P. ENGELHARDT

CARL GEO. SIEPMANN

Decapitation of *Notonecta insulata* Kby. by *Dineutes* sp.;—
On July 4, 1933, I was watching from the dock at Onteora Lake, in the Catskills, the very numerous nymphs of *Notonecta insulata*, mostly in the last instar. These nymphs seem not to cling to the surface, but stay some distance below, coming up now and then for air. In a little cove formed by the dock and the shore I saw some half dozen just transformed adults floating on the surface with wings outspread and quite dead; all were headless. While I watched, one nymph molted and transformed to the adult, at the surface, as usual. As it struggled after casting its skin, two *Dineutes* pounced on it; when they left it, its head was gone. The decapitation was so quickly done, it was impossible to see how it was accomplished.

The color of the just transformed adult is a pure white, slightly creamy, with a slight discoloration along the edges of the wings now and then in some of them. The specimen pinned kept its white color, and has not darkened at this writing (April 26, 1934).—J. R. DE LA TORRE-BUENO, White Plains, N. Y.

A NEW BYTHOSCOPIDAE FROM COSTA RICA.

BY S. C. BRUNER AND Z. P. METCALF.

The new species described below would seem to constitute a distinct new genus of *Bythoscopidae* and to be worthy of an isolated description.

Chinaia genus nov.

Head broadly rounded anteriorly in both lateral and vertical views, short, scarcely as broad as pronotum. Face nearly vertical, more or less convex, smooth; ocelli situated on the face as in *Idiocerus*, not strongly differentiated. Genae broadly rounding below to apex of anteclypeus. Rostrum very short, in type species scarcely reaching base of anterior femora. Antenna inserted in shallow cavity beneath sharp ledge near eyes; basal segment considerably enlarged, extending laterally to margin of eye, much larger than second segment; the seta filiform, very long, sometimes extending beyond apex of elytra, without preapical enlargement in either sex. Pronotum and scutellum as in *Idiocerus*. Pronotum broad and short fully three times as broad as long, about as long as crown, anterior lateral margins short strongly divergent, posterior lateral margins broadly curved and merging into posterior margin. Scutellum as long as pronotum forming a nearly equilateral triangle. Elytra elongate, narrow, without an appendix, nervures thin, not distinctly raised, without papillae, evanescent and without distinguishable cross-veins before apex of clavus.

This genus because of the position of ocelli necessarily falls within the family Bythoscopidae and is somewhat nearer the genus *Idiocerus* than any other. However, it is apparently not very closely related to that or any other described genus. It is at once separated from *Idiocerus* by the absence of an appendix to elytra, the greatly elongated antennae inserted under a small sharp ledge near eyes with enlarged basal segment; narrower, rounded, head; and especially by the elongate delicate elytra with evanescent or obsolete venation over basal half. The latter character and general delicate appearance are suggestive of the Eupteryginae in spite of large size.

The species described by Fowler in the *Biologia Centrali-Americana*, 2, as *Tettigonia dorsignata*, page 282, plate xix, figure 6, and *T. rubescens*, page 282, plate xix, figure 7, and later in the supplement of the same work (page 322) removed from the Cicadellinae, but without generic designation are also members of this genus.

The antennae were probably even longer than shown on the plate as they are very fragile and easily broken. These and the new species described below are brightly colored insects, which coloration would appear to be characteristic. The vertex in the three known species is relatively longer than *Idiocerus*.

The genus is dedicated to Mr. W. E. China, of the British Museum.

Orthotype: *Chinaia bella* n. sp.

***Chinaia bella* n. sp.**

A beautiful orange red and pale green species marked with black, resembling *Tettigonia rubescens* Fowler. Crown of head wider than long, broadly excavated posteriorly, extending as a narrow triangle behind the eyes, sloping anteriorly and broadly curved and merging into the face. Face with the lateral margins slightly diverging to the lower level of the eyes, then suddenly converging in a distinct ledge above the antennae. Ocelli inconspicuous on a level with the middle of the eyes near the lateral borders. Antennae with the flagellum when folded backward extending somewhat beyond apex of elytra, basal segment as long as and about twice as broad as second segment. Lateral margins of the clypeus broadly converging to the anteclypeus, which is spatulate in shape. Lorae with the lateral margins curved not extending to the apex of the anteclypeus. Lateral margins of the genae broadly curved, converging extending beyond the apex of the anteclypeus. Pronotum broad, nearly three times as broad as long. Scutellum with broad transverse impression, posterior half convex. Venation of elytra obscure except on the translucent apical membrane.

Female genitalia: penultimate ventral segment broad, short, slightly excavated; ultimate segment about three times as long as penultimate, the apical half triangularly produced with sides of the triangle sinuate, giving the appearance of a median tooth, apex with small notch, slightly embrowned; pygofer with a row of pale bristles along inner margin; ovipositor distinctly exceeding pygofer. Male, last ventral segment nearly straight behind, subequal to penultimate segment; plates convex, inner margins raised over central area and meeting at rather acute angle, inserted about one-fifth of length behind posterior margin of last ventral segment, sides rounding to lateral margins, without bristles but with scattered growth of fine white hairs, apices well rounded, exceeded by pygofer which are produced behind into pairs of laterally compressed, horizontal, chitinous processes.

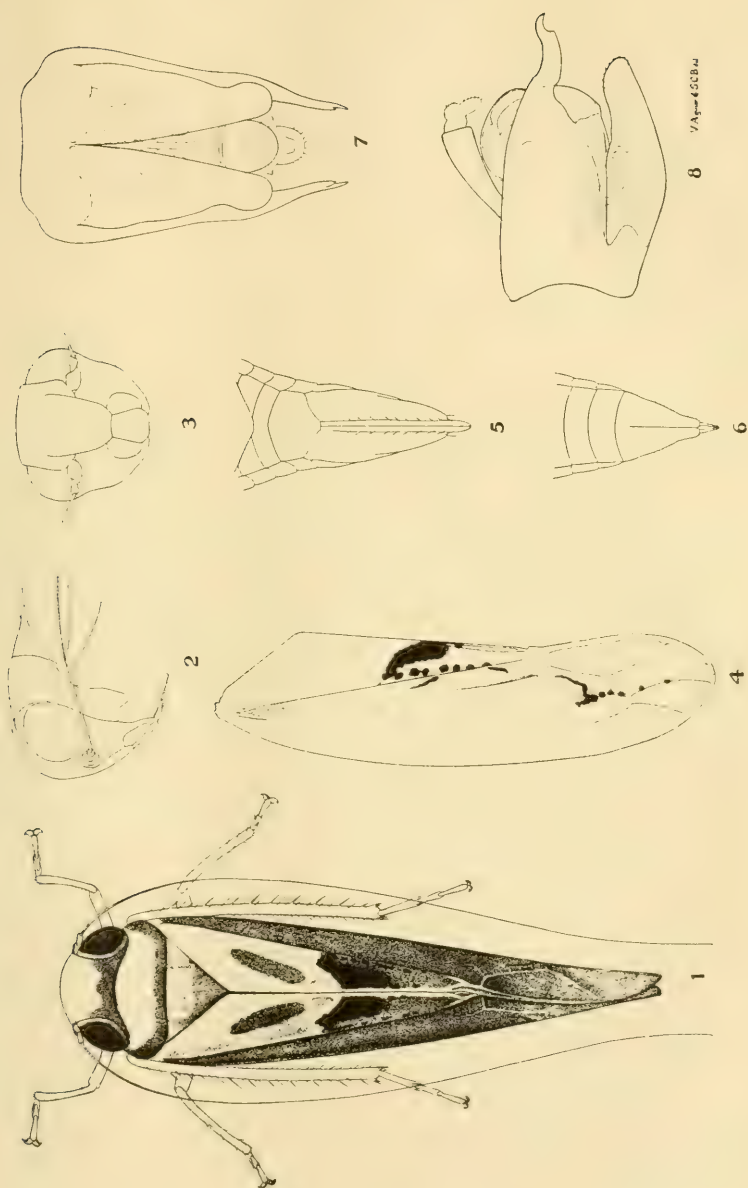
General color above bright yellow or pale greenish yellow,

heavily marked with orange red with a few black markings on elytra. Crown light yellow to pale, slightly greenish yellow with a broad band of orange red on posterior margin, and often a pair of obscure, poorly defined, translucent dashes or rounded marks about middle; eyes black. Pronotum light yellow or pale greenish yellow with posterior and lateral margins broadly orange red. Scutellum, basal half pale yellow or greenish yellow, the broad lateral margins and narrower central area usually washed with orange yellow; entire apical half orange. Tegmina with apical fourth translucent pale smoky yellow with 4 or 5 black dots along veins or disc; inner half more largely orange red, this more intense anteriorly next to claval suture and over an oblique area projecting from inner margin before center and towards apex, fading gradually to pale greenish yellow or light yellow over costal area, separated from translucent apical area interiorly by a variable, irregular, incomplete narrow black border; clavus pale yellow or greenish yellow on basal half, paler behind and over outer margin, with broad orange red dash on disc, the apical half orange with an obliquely placed, irregular, narrowly triangular black mark anteriorly followed by a number of black spots along inner and outer margins. Wings pale yellowish to dull pinkish hyaline with yellowish or pink veins, lightly infusate apically with dark veins behind cross-veins. Beneath including face and legs largely pale flavescent, sometimes distinctly greenish, especially on abdomen which is washed with orange above; base of antennae, lower margins of face, anterior tibiae and knees, basal third of posterior tibiae and sometimes the frons, more or less washed with orange yellow. The sexes are similar, the female usually slightly larger.

Length: 6-7 mm.

Holotype, male, San José, Costa Rica, March, 1933, C. H. Ballou, coll., on avocado. *Allotype*, female, San José, Costa Rica, June, 1932, C. H. Ballou, coll., on pear and avocado. *Paratypes*, 14 specimens of both sexes from San José, Costa Rica (S. P. de Montes de Oca) all collected on avocado by C. H. Ballou, June, 1932; January and March, 1933. Types and 7 paratypes in collection of Z. P. Metcalf, 5 paratypes in collection of the Estación Agronómica, Cuba, and one paratype in British Museum.

To eliminate any possible uncertainty regarding the specific identity of this form a specimen was sent to the British Museum where Mr. W. E. China very kindly compared it with the type of *Tettigonio rubescens* Fowler, confirming our belief that it was distinct specifically although congeneric.



EXPLANATION OF FIGURES.

PLATE VII

Chinaia bella n. sp.

- Fig. 1.—Dorsal view of female.
Fig. 2.—Lateral view of head and thorax.
Fig. 3.—Face.
Fig. 4.—Elytron.
Fig. 5.—Female genitalia.
Fig. 6.—Male genitalia.
Fig. 7.—Internal male genitalia, ventral view.
Fig. 8.—Same, lateral view.
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Fulvius imbecilis Say, a mirid new to New York.—It is always a pleasure to add to the faunal list of our great State; and here we have another of those oddities or accidents of collecting, which makes field entomology such an adventure, as this record shows. While getting fire-wood from my cellar, I came across a log with loose bark, which I always pry off to see what may be found—aradids mostly, or perhaps *Xylocoris*. This time two agile little bugs ran out from under the bark. One got away, but the other I was able to catch with my fingers and to carry up safe, if slightly crushed, to my study, where it landed in a killing bottle. When mounted I saw at once it was something never seen by me before. My friend Dr. R. F. Hussey, to whom it was shown, recognized it as a *Fulvius*. The determination has been checked by Hemiptera of Connecticut, by Blatchley's Heteroptera of Eastern North America, and by Say's original description. It is unmistakably *F. imbecilis*. Say originally recorded it from Indiana; Dr. Knight in various papers has given it as found in Florida, Virginia, Alabama, Tennessee, Illinois, District of Columbia and New Jersey; Blatchley records it from North Carolina, Michigan, and Indiana, and Van Duzee's Catalogue recites it from Pennsylvania, Maryland, Delaware, Virginia, and Indiana. It is not recorded in the New York State List by Dr. Knight in the list of Miridae, nor have I been able to find any such record elsewhere. The little bug was found on October 11, 1933, in White Plains, but the logs came from further up the County, so Westchester County, even though a broader record is probably more accurate.—J. R. DE LA TORRE-BUENO, White Plains, N. Y.

METHODS AND TECHNIQUE FOR THE COLLECTOR.

On Measuring Insects under the Microscope.—The only proper way to measure extremely small insects (10 mm. or less long), or the small parts of larger insects—tarsi, antennal joints, and so on—is by means of a carefully calibrated eye-piece micrometer. In my own practice, measurements can be made to within .05 mm.—that is, within $1/500$ inch. This result is easily attained by the use of a step (scalar) eye-piece micrometer, calibrated to a stage micrometer.

This is how it is done: The eye-piece micrometer is sharply focused to the upper lens of the eye-piece by pushing up or down the diaphragm in the eye-piece. This must be done for the eye used for observation; or, in the case of a binocular microscope, for whichever eye is to do the measuring. The stage micrometer is now sharply focused. It will be noticed at once that the divisions of the eye-piece micrometer do not coincide exactly with those of the stage micrometer. Now, the eye-piece is pulled out (and, of course, the microscope refocused) until *two* of the step-divisions of the eye-piece micrometer coincide exactly with the 1 mm. scale of the stage micrometer. With a sharp instrument scratch a line all around the eye-piece at the top of the sleeve, thus making it possible to change eye-pieces at any time and to replace the eye-piece with the micrometer at the exact measuring focus. The binocular combination of 55 mm. objective and $\times 10$ eye-piece gives ordinarily $\times 17$ or $\times 18$ magnification, but the drawing out of the eye-piece makes the magnification an exact $\times 20$ without affecting the optical qualities of the instrument. This is the best combination for general use. For minuter measurements, the 40 mm. or the 24 mm. objective with the $\times 10$ eye-piece give magnifications of $\times 40$ or $\times 80$; that is, the eye-piece micrometer divisions become respectively .025 mm. or .0125 mm., equivalent respectively to $1/1000$ and $1/2000$ of an inch, which is perhaps too fine for anything but the minutest insects—1 mm. or less in length, with correspondingly minute appendages.

And in this connection, descriptions and detailed taxonomic or anatomical studies should always specify at what magnification they are made; and at what magnification the smaller structures are visible, if they are clear at or have been described at greater magnifications than that of the general descriptions. Descriptions and structural studies lacking this concrete information are still walking with Adam in Eden, in primordial innocence.

J. R. T.-B.

BOOK NOTES.

Recent Advances in the Study of Plant Viruses, by Kenneth M. Smith, with a Foreword by F. T. Brooks. (Pp. i-xii + 1-423, 1 plate and text-figures 1-67. P. Blakiston's Son & Co., Inc., Philadelphia, Pa. \$4.00.)

Phytopathology, as everyone knows, is the science, or study, of morbidity in plants. Many of the diseases which afflict plants are clearly contagious and are produced by viruses—that is, poisons—of various kinds, sometimes the result of germ diseases and at others arising from infection with the so-called filterable viruses. The work before us treats of these viruses, their nature, action and conveyance in fourteen chapters. Three of these (about 1/5 of the book) are on "Insects in Relation to Viruses," bringing together much scattered information into a coordinated whole. These chapters (V to VII), survey the insect species concerned as carriers; give a numerical analysis of insect types in relation to viruses, the technique of managing the insects in plant virus studies, various observations on the factors in relation to insects as vectors, and methods of insect feeding in relation to transmission of viruses.

Of the 23 Orders of insects considered, four only—the Orthoptera, Thysanoptera, Hemiptera (sens. lat.), Coleoptera, are possible vectors; two of these—Orthoptera and Coleoptera, which have biting mouth parts—are practically negligible. The principal offenders, as might be expected, are among the numerically abundant Hemiptera, specially the Homopterous Aphidae and Jassidae. The paucity of records of Heteropterous vectors is probably due to lack of knowledge rather than to absence of injury, particularly among the most abundant Miridae.

From the point of view of entomological technique, the part of Chapter V with regard to management of insects will be of great use to students of life-histories, particularly of the smaller plant feeding bugs. This chapter alone makes the book desirable to students of the biology of the Hemiptera. Added to this, each chapter appends a long list of references.

The work has the usual indices—author and subject—and a brief but informing glossary of terms.

The work is to be recommended to entomologists whose interests lie beyond a dreary waste of pinned bugs into that most interesting field of observation—the myriad ways of life of the uncounted insect legions.

J. R. T.-B.

EDITORIAL

WHAT IS AN AMATEUR ENTOMOLOGIST?

One of our readers has asked this question after reading our February editorial.

By rigid definition an amateur in anything is a person who follows a given pursuit for pleasure and not for gain or as a means of a livelihood; one whose gainful vocation is not his unprofitable avocation.

From this it follows that, strictly, an amateur entomologist is one whose study of insects is an avocation for leisure hours apart from his labor for a livelihood. This excludes at once anyone who practices entomology as a profession; and whose antecedent training has had that end in view.

Now, there is really no clean-cut boundary between these two classes, for sometimes the amateur may receive remuneration for some piece of expert work in his field; and the professional may follow with ardor some study not even remotely connected, except in kind, with his professional duties.

A rough classification is that all teachers of entomology and all economic workers are professionals; all collectors and casual students of insects as a side line are amateurs of high or low degree.

But perhaps after all it is a question of the psychological approach!

J. R. T.-B.

VOICES OF THE DUSK.

The crystal-winged cicada's wooing song
Rises shrill and falls in cadenced throbs
In the tepid scented summer dusk.
His keen voice gashes now the quiet air.
As darkness flows, his song of love is stilled—
Its piping ceases till the morrow's dawn.
And now, the night-long strains of black and cryptic
Crickets constant wound the ear.

J. R. T.-B.

PROCEEDINGS OF THE SOCIETY.

MEETING OF DECEMBER 14, 1933.

A regular meeting of the Brooklyn Entomological Society was held on December 14, 1933, at the Brooklyn Museum.

Present: Mr. Wm. T. Davis in the chair, and Messrs. Ballou, Cooper, Eisenhardt, Engelhardt, Nicolay, Ragot, Torre-Bueno and Lemmer; and visitors, Dr. and Mrs. R. F. Hussey and Mr. Stecher.

Minutes of the meeting of November 16 were read and approved. In the absence of the Secretary, the Chair appointed Mr. Lemmer Secretary *pro tem*.

For the Publication Committee, Mr. Torre-Bueno reported progress.

Mr. Torre-Bueno also showed the following: the centenary volume History of the Entomological Society of London; Dr. P. de Peyerinhof's critique of Böving and Craighead on the Larvae of Coleoptera; and Dr. C. H. Kennedy's Methods for the Study of the Internal Anatomy of Insects.

The Chair appointed the following Nominating Committee: Messrs. Lemmer, Ballou and Nicolay.

Mr. Eisenhardt showed two species of *Cocytia*, *durvillei* and *ribeia*, from Alon Island, Oceania; there is only one other species known in the genus.

Mr. Davis showed a copy of an old work, Gallery of Nature and Art by several authors, printed in London in 1819. He also showed two different insects in reference to this work, *Cicada plebeja* L. and *Cicada orni* L., considered by the ancients to be the same.

Dr. Roland F. Hussey, who spoke on "Collecting Insects in Paraguay in the Summer of 1931-1932," reported the following captures: *Anasa* sp., whose eggs were attached to the parenchyma of the developing fruit; *Pachycoris torridus*, adults of which were standing over the eggs till hatched and sometimes longer; *Spiniger* spps., *Scamurius amabilis*, *Athaumastus haematicus*, *A. subterlineatus*, two or three species of *Linnogonus*, *Telmatometra*, *Brachymetra*, *Rhagovelina*, an undescribed *Martarega*, *Mesoveloidea* and *Hydrometra*. Pentatomidae and Coreidae were common in certain grassy glades. Three or four species each of *Euschistus* and *Mormidea* were found at night, feeding high on grass stems. Meloidae, certain Miridae, *Banasa* sp., *Discocephala* sp., *Dryptocephala punctata*, *Edessa* sp. (*rufomarginata*?), were taken on the small tree or bush, *Solanum verbascifolium*, the last two in nymphal stages on this plant only. *Dysdercus ruficollis*, a wide-spread

South American Pyrrhocorid, swarmed in immense numbers on *Sida rhombifolia*, as well as on other plants. *Euryophthalmus rufipennis* was numerous on *Senecio* sp., and some on other Compositae at the forest margins. Dr. Hussey gave attention almost wholly to the Hemiptera. He spent three weeks at Colonia Independencia near Villarrica. In mid-November he proceeded northward across the watershed to the high plains area beyond Caá Guazú. Here numerous small streams flow eastward into the Paraná. He collected here for two months. The plains are sandy with sparse grass and little succulent herbage, but bunch-grasses and *Artemisia* were common. The plains are dotted with dwarf palm-trees, *Cocos jatay* and some groups of two or three trees of the Euphorbiaceous *Sapium haematospermum*. Dr. Hussey could not collect much in the high forest, as the tree-top fauna was inaccessible. He showed, however, 5 or 6 closely allied species of Bryocorine Miridae taken at one time in the calyx of the "Guembe" flower (*Philodendron* sp.). Light captures were mainly Miridae, small Myodochidae and various Reduviidae, especially *Sirthenca stria*, *Pygolampis* sp., *Stenopoda cinerea*, etc. Collecting at light was poor, although the year before it was said to have been excellent.

Mr. Engelhardt exhibited some hackberry butterflies collected in southern and western Texas. These butterflies, he said, are apt to be very common in regions of the West wherever their food-plant hackberry, *Celtis occidentalis*, prevails. Holland's Butterfly Book, pl. 23, beautifully illustrates seven species of these butterflies and others are cited in his text. At a first glance it seems easy to compare and name one's specimens, but on a close inspection one does not feel so sure. After all, there appear to be only two main divisions, one with eye-spots in the primaries (*Celtis* group) and the other with these eye-spots lacking (*Clyton* group). Under these headings specimens can be arranged readily, but the question is, whether the many forms are entitled to recognition as species, or whether they are merely variations and geographical races of the above two main groups. Mr. Engelhardt's specimens were collected at random, mostly from the Davis Mountains, Texas, and are, according to Holland, as follows: *Clyton* group—*Asterocampa flora* Edwards, males and females, Davis Mts., Texas; *Celtis* group—*A. montis* Edwards, male, Ellsworth, Kans.; female, Austin, Texas; *A. antonio* Edwards, both sexes from Davis Mts. and San Antonio, Texas; a dark brown form of *antonio*, not named, from Davis Mts. and Big Bend, Texas. Aside from variations in color and size, some of the so-called species show a greater

angulation of the hind wings in the males. No doubt this subject calls for more intensive investigations, especially breeding.

Mr. Cooper recorded as new to New York State, *Micromalthus debilis* in rotten wood, Bronx Park; and in rotten planks, New York City, taken by Mr. Alan Scott, Columbia University.

Adjourned at 10.10 p. m.

FREDERICK LEMMER,
Secretary pro tem.

MEETING OF JANUARY 11, 1934.

A regular meeting of the Brooklyn Entomological Society was held at the Brooklyn Museum on January 11, 1934.

Members present: Mr. Davis in the Chair, Ballou, Cooper, Engelhardt, Dr. Hussey, Lacey, Moennich, Ragot, Rau, Dr. Risch, Sheridan, Shoemaker, Torre-Bueno, Wilford and Lemmer. Visitor Mr. Hans Stecher.

Minutes of December meeting read and approved.

Treasurer's report for 1933: Income, \$1,658.40. Disbursements, \$1,539.85. On hand and in banks, \$938.96 (Dec., 1933). Report received with thanks. Mr. Engelhardt stated that considering conditions the Society is doing quite well as far as finances are concerned.

Mr. Torre-Bueno proposed for membership Dr. Roland F. Hussey. He was elected by acclamation.

Election of officers resulted as follows:

President, W. T. Davis.

Vice-President, J. R. de la Torre-Bueno.

Recording Secretary, Carl Geo. Siepmann.

Corresponding Secretary, Frederick Lemmer.

Treasurer, George P. Engelhardt.

Librarian, Charles Schaeffer.

Curator, I. M. Sheridan.

Delegate to N. Y. Academy of Sciences, Geo. P. Engelhardt.

Mr. Lacey reported capture of *Leptura deleta* from Mass.

Mr. Davis reported and showed *Mantis angustipennis* Sauss., from Staten Island.

Mr. Cooper spoke on the Taxonomy and Ecology of the Byrrhidae. He pointed out that correlation and structural characters of both larva and adult with biological data must result in a considerable change in the composite known to the older authors as the Byrrhidae. The Nosodendrids and Chelonarids have long been properly removed from the Byrrhidae, and Brown in 1910 writing of the New Zealand Byrrhidae considered the Linnichids

as constituting the family Linnichidae. Ecological and structural peculiarities of the Amphicyrtids are held by Mr. Cooper sufficient to warrant the establishment of the family Amphicyrtidae, to be included in the Byrrhoidae.

Among the more interesting structures of members of the genus *Byrrhus* are the so-called "ocelli" or "eye spots," situated on the adult epicranium. They are entirely of a conjectural function, and are paralleled by structures of a similar nature common to the members of a Carabid genus.

The true Byrrhids, in the main, are moss feeders, the larvae apparently feeding on the protonema of *Dicranum* and its allies. The adult Byrrhid is generally to be found throughout the year, and hibernates in various situations.

The Byrrhidae, limited as above, were then discussed from the viewpoint of their distribution in time and space. The Byrrhids were probably a circumpolar group peculiar to the Northern hemisphere. The present distribution of the members of the genus *Byrrhus* has probably largely resulted from Pleistocene glacial advances and recessions.

Adjourned at 10.20 p. m.

FREDERICK LEMMER,
Secretary pro tem.

IMPORTANT NOTICE!

Under conditions of the prevalent financial depression we have secured an option on the few remaining available sets of the early volumes of the BULLETIN and of ENTOMOLOGICA AMERICANA in the hands of dealers. These we offer at the following greatly reduced prices for *immediate* sale.

THE BULLETIN, vols. 1-7 (1878-1885), cloth bound	\$25
ENTOMOLOGICA AMERICANA, vols. 1-6 (1885-1890), cloth bound	20
The same, unbound	17.50

POSTAGE ADDITIONAL.

These volumes teem with papers of prime importance by leading American pioneer authors and are essential to every working entomological library. They have been out of print for some time and will be difficult to obtain, even at premium rates, once our limited supply is exhausted.

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Please address: Geo. P. Engelhardt, Treasurer, Hartsdale, N. Y.

EXCHANGES

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

COLEOPTERA.—Am interested in exchanging Coleoptera. Carl G. Siepmann, R. F. D. No. 1, Box 92, Rahway, N. J.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa*, *macaria*, *mormonia*, *malcolmi*, *nokomis*; *Melitaea neumogeni*; *Lycaena speciosa*; etc. Send lists. Dr. John A. Comstock, Los Angeles Museum, Exposition Park, Los Angeles, Calif.

CATOPINI: *Catops* (*Choleva*), *Prionochaeta*, *Ptomaphagus*.—Wanted to borrow all possible specimens of these genera from North America for a revisional study. Correspondence solicited.—Melville H. Hatch, Dept. of Zoology, Univ. of Wash., Seattle, Wash.

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Vol. XXIX

OCTOBER, 1934

No. 4

BULLETIN

OF THE

BROOKLYN ENTOMOLOGICAL SOCIETY

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OBSERVATIONS ON *PACHYCORIS TORRIDUS* (SCOP.), WITH REMARKS ON PARENTAL CARE IN OTHER HEMIPTERA.

BY ROLAND F. HUSSEY, New York City, N. Y.

I.

In east-central Paraguay the Scutellerid *Pachycoris torridus* is most frequently found on the under side of the leaves of a small, scraggy, rough-barked tree called the *curupí-cahú*. This plant is of the family Euphorbiaceae, and Mr. Pedro Jorgensen, of Villarrica, informs me that the botanists know it by the name *Sapium haematospermum*. On the sandy plains north of Caa Guazú this tree occurs singly or in groups of two or three, and only rarely is there any bushy growth about their bases. Usually the *Sapium* is much less than ten meters in height, but on better soil or on terraces above the streams it sometimes exceeds this size.

Two other Hemiptera, in my experience, are also primarily associated with the *curupí-cahú*. One is a Coreid whose description will shortly appear under the name *Anasa sapiicola*, a species whose eggs and nymphs, like the adults, occur in mid-summer on the developing fruit. The other is an unidentified Bryocorine Mirid which occurs on the leaves. Neither of these, however, approaches in interest *Pachycoris torridus*, as this species adds another to the relatively few which are known where the parent stands guard over the eggs and the young nymphs.

Pachycoris torridus is a highly variable species, but the specimens I took in Paraguay in 1931-32 are more constant in their coloration than others I have seen, and none of them can be referred to either of the varieties named by Breddin (1). The ground color varies from pale sepia to black, with the extremes less numerous than the intermediates. The pronotal red spots apparently are always eight in number, though the two on the median

line sometimes are extremely reduced, to mere points or short narrow lines. Berg (2), speaking of the Argentine specimens, says there are usually thirteen scutellar spots, the median one of the third transverse row commonly being absent. In my Paraguayan material the scutellar spots commonly are fourteen, arranged in four transverse rows of five, four, three, and two spots respectively. But in about one-fifth of my specimens there are only twelve spots, as the two median ones of the *second* row are absent. All the spots are narrowly edged with black, but in darker specimens this is progressively less evident until finally no such margin is visible on individuals whose ground color is black.

I first took this species on December 31, 1931, from a *curupí-cahú* growing on a narrow terrace above a small stream. Subsequently I discovered individuals on other trees of the same species, both in similar situations and on the arid campo; and once only I found a specimen, with its eggs, under the leaf of a different plant near the place where my first specimens were seen. All the *Pachycoris* I found, up to the time of my departure late in January, were on the under side of the leaves, and almost half of them were standing over their eggs when discovered. It is interesting to note also that I secured ten times as many females as I did males of this species.

The leaf of the *curupí-cahú* is smooth-surfaced, long and narrow, in shape not unlike the leaves of many willows common in eastern North America, and its margins are entire. The lower surface is longitudinally elevated slightly by the mid-rib, but is hardly broken by other veins. The leaf, for about three-fourths of its length, is about 9 to 10 mm. wide—or, in other words, is of about the same width as the *Pachycoris*.

The individual eggs of *Pachycoris torridus* are oblong-elliptical, and measure about 1.3×1 mm. The chorion is unmarked, as seen under low magnification (10x), and no chorial processes are visible near the anterior pole. The eggs are deposited in flat plaques, each ovum glued to the leaf surface at its caudal end, and the number of eggs per plaque averages probably about 100. I have found masses with as few as 50 eggs, and others with nearly three times that number. Throughout the greater portion of the plaque the eggs are regularly arranged, in straight lines intersecting at angles of 60° , so as to produce a honey-comb pattern in the mass as a whole. Near the edge of the mass, apparently among the eggs laid last, the regular pattern is often more or less lost and the ova are irregularly disposed, but this seems to be true only of the larger egg masses.

When first laid the eggs are pale honey yellow, this color being due to the appearance of the yolk as seen through the semi-transparent chorion. As the embryos develop they rapidly acquire a red pigmentation, visible first in the eye and along the legs, and the egg mass generally acquires a reddish color as a result. Here and there in the mass may be seen eggs which fail to develop, whose yellow hue makes them conspicuous. In my specimens these amount to about 10 per cent of the total number, and their position or arrangement in the plaque is most haphazard.

At the edge of the mass, though commonly only in the larger plaques, may be seen other eggs which also do not develop, and which are readily recognized by their grayish or blackened appearance. Though I have no direct observations on them to support my belief, I regard these as infested with hymenopterous egg parasites, as I have observed similar phenomena in the egg masses of other Hemiptera. Ayyar (3) has observed *Telenomus indi* emerging from similarly blackened eggs of the Indian *Cantao ocellatus*, a Scutellerid with similar brooding habits; and like myself he found these blackened ova only at the edge of the egg mass. In *Pachycoris torridus* the blackened ova may amount to as much as 15 per cent of the total number of eggs in the mass, and in my experience they occur only in that part of the mass which is beneath the caudal end of the parent as she stands over them.

Throughout the period of incubation, and even throughout the first nymphal stage after the young emerge, the parent *Pachycoris* stands guard over her brood. The *curupí-cahú* leaf, as has been said, measures 9 to 10 mm. in width, and the egg mass occupies nearly its entire breadth. In length the plaque may measure somewhat more, and the average dimensions, I would say, are about 9×11 mm. Thus the mass commonly occupies an area just about as great as can be covered by the adult bug. After emergence the young do not move about at once, but commonly remain huddled for a time in a mass whose area is nearly the same as that of the egg mass, but of somewhat greater depth.

Whether the female takes food from the plant during this time is a question I cannot answer. Certainly she does not move about, nor can she be driven from her position, although *Pachycoris torridus* flies rather readily under other circumstances. If approached from either side while brooding over her eggs or young, the bug most commonly tips her body toward that side, pivoting as if on a longitudinal axis, so as to present the dorsal side of the body toward the approaching menace. Ordinarily, if the bug is approached from in front, the antennae are extended with their tips against the leaf

and the anterior part of the body is lowered as if to shield the nymphs or the eggs from view, and consequently from harm. If one approaches closer, the insect will sometimes start swaying from side to side with abrupt, jerky movements of the posterior part of the body, the head and the fore legs being kept motionless; and these jerky movements may be strong enough to cause the leaf to flutter as if in a breeze, or to be plainly felt if the end of the leaf is held in the fingers. At the same time the wings and the scutellum may be slightly raised. Only once did I observe an individual which lifted its wings and raised the fore part of the body as if to attack the approaching enemy. Excepting only the jerky movements referred to, all the changes of position made by the *Pachycoris* under these conditions are very slow and deliberate, and the bug gives an impression of extreme clumsiness.

The normal position of *Pachycoris* on the leaf is longitudinal, and commonly the head is directed toward the distal end of the leaf. Often the bug stands with its claws hooked under the edges of the egg mass, and if the insect is lifted from its place very frequently the entire egg mass is torn away from the leaf and is then held in the air by the bug, firmly gripped with the claws of all six feet. At other times the claws may be hooked over the edge of the leaf, gripping the latter so strongly that the plant tissue may be torn and a flow of latex started if the bug is removed. I have rarely seen a *Pachycoris* change its position on a leaf or even move its feet when approached; and on more than one occasion I have removed leaves from the trees and handled them for ten minutes or more without causing the bugs to move.

II.

It is surprising that this remarkable habit of *Pachycoris torridus* has not previously been reported in the literature. The species is a common one throughout much of South America, and it would seem that its behavior must surely have been noted by some naturalist before this. Mr. H. G. Barber, in conversation, has told me of a similar habit in an Antillean species of the genus, probably *P. fabricii*, but I have failed to find an account of it in his papers or in any other publication in my library.

This species is one of the Tetyrine Scutelleridae, and the only one I know of for which such a habit has thus far been described. On the other hand, two Oriental species of the subfamily Scutellerinae, belonging to closely allied genera, are known to exhibit phenomena which are almost precisely similar. *Tectocoris diophtalmus* (= *T. lineola*), according to Dodd (4), attaches its eggs to

upright twigs and then stands over them until they hatch. Ballard and Holdaway (5), in a life-history study of this cotton pest in Queensland, have confirmed Dodd's statements, though modifying them to some extent. Apparently, in this species the female may occasionally leave her eggs but will always be found near-by, and her brooding may continue for as long as seventeen days. Ballard and Holdaway also report having the adult bug move her body so as to interpose it between her eggs and Chalcidid wasps which were buzzing around as if attempting to reach them.

The brooding of a second Scutellerine, *Cantao ocellatus*, seems first to have been referred to by Lefroy (6), and has been the subject of a study by Ayyar (3), to which reference has already been made. Unfortunately I have not been able to utilize Takahashi's paper (7) dealing with this species. In India *Cantao ocellatus*, according to Ayyar, deposits its eggs on the leaves of a Euphorbiaceous tree, *Trewia nudifolia*, and its brooding habits seem precisely similar to those I have described for *Pachycoris torridus*, except that Ayyar does not mention any jerky swaying movements from side to side like those occasionally seen in the Paraguayan species. The first mention of brooding habits in the Scutelleridae was published by Montrouzier (8), but without definite reference to any one species. Kirkaldy (9) believed that his account referred probably to *Tectocoris diophthalmus*, but in my opinion it might equally well apply to *Cantao ocellatus*, or possibly to some other species.

Not the least amazing feature of the performance given by these three insects is their close conformity with that of the European Pentatomid *Mecadorus griseus*, whose habits were first noted by Modéer (10) and DeGeer (11). Their accounts were ridiculed by Fabre (12), but Kirkaldy (13) has shown conclusively that Fabre, with his unfortunate disregard for the systematic phase of entomology, had not even troubled to obtain for his experiments the same species which had been observed by those earlier writers. The observations of Modéer and DeGeer have since been confirmed and amplified by a number of competent observers: an excellent summary of *Mecadorus griseus* is given by Butler (14), and figures of the brooding insect have been published by Heymons (15) and Nielsen (16), the latter from a photograph. In addition to the papers cited by Kirkaldy (13) and Butler (14) on *Mecadorus griseus*, I may call attention to the remarks of Schouteden (17), Jensen-Haarup (18), and Schumacher (19) on various phases of its brooding habits.

On comparing the behavior of the Paraguayan *Pachycoris torridus* with that reported for the European birch-tree bug, *Meadorus griseus*, I am struck with the almost complete agreement between the two, even down to small details. And this is the more remarkable when we consider that *Pachycoris* and *Meadorus* are not closely related forms and that they occur in widely separated regions. Indeed, all the reported cases of brooding in the Hemiptera occur by ones or twos in regions far remote from one another; and usually single species only are concerned, while their nearest relatives display no such behavior. No such case has yet been reported, so far as I am aware, for any Pentatomid or Scutellerid in Africa or in North and Central America, if we except the doubtful one mentioned by Rau (20) of a female *Mecistorhinus tripterus*, found with second instar nymphs on a banana imported into Missouri from tropical America, an association which may have been purely fortuitous. Africa and North America, however, have given us instances of parental care in other very distinct groups of Hemiptera.

In North America brooding has been reported in two species of Tingidae and in one species of the Mezirine Aradidae. The Tingidae referred to are *Gargaphia solani* and *Gargaphia tiliac*. Weiss (21) speaking of the latter, remarks that a female is always in attendance during the incubation period of the eggs, though apparently she does not stand over them in the manner described above for the Pentatomoids; and each cluster of nymphs usually has a female standing near-by until the young are fully grown. Fink (22) writing of *Gargaphia solani*, describes a similar habit in this species, and adds that if the brood of nymphs migrates from one leaf to another, the female directs the way and keeps the nymphs together during the march by stroking or pushing them with her antennae. I may add that I have seen what I take to be similar family groups of nymphs with guardian adults in a third species of Tingidae (unidentified) occurring on *Cordia corymbosa* in Paraguay, but I first discovered this species almost at the end of my stay, and consequently had no opportunity to observe its habits closely.

In Texas McClure (23) reports the Aradid *Neuroctenus pseudonymus* as laying its eggs in masses of from ten to fifty ova, in the channels cut by wood-boring insects under the bark of a dead oak tree. After oviposition is completed and the female has departed from the scene, another adult (which McClure thought was probably the male) crawls astride the eggs and remains there im-

mobile for two weeks or so, until the eggs hatch. The young nymphs of this species, like those of *Pachycoris torridus*, remain clustered under their guardian for a day or two after their emergence. On removing specimens to the laboratory, McClure found that the brooding instinct in *Neuroctenus pseudonymus* is strong enough to overcome the normal negative phototropism of this species, the brooding individual being the only one which failed to migrate to the darker side of the piece of bark when exposed to a strong light.

From Africa comes the amazing case of a Reduviid, *Rhynocoris albopilosus*. Bequaert (24) first reported that the female of this species stands over the eggs, but a year later he published a correction (25) stating that it is the *male* which performs this task. The eggs are attached to herb stems at heights of about 30 cm. from the ground, in single plaques containing about two dozen eggs, arranged in two to five irregular rows. The insect stands over them with the venter almost touching the eggs, and if alarmed it may run up and down the plant stem but does not fly. This behavior was noted by Bequaert on three occasions, in the Belgian Congo, and he reports having seen the watchful bug repulse Chalcidid wasps from the eggs which it was protecting. After the young emerge they run about on the plant stem and frequently will be seen walking over the guardian adult.

Cantao ocellatus and *Tectocoris diophthalmus* are closely related forms, and possibly the behavior of these two species may be of common origin: but this is doubtful in view of the absence of similar habits in other species of *Cantao*, as far as they have been reported. In this connection, however, we must bear in mind the possibility that Montrouzier's remarks may refer to one or another species of *Cantao*. There is a strong probability of common origin for the habits observed in the two species of *Gargaphia*, but the brooding habit must certainly have arisen independently in each of the other cases where it has been observed—unless we are to accept the untenable alternative that the brooding habit was once general throughout a great part of the terrestrial Hemiptera and that these few species are the only ones in which it still persists.

In the Hemiptera, then, we have the remarkable phenomenon of a certain type of parental solicitude which has appeared independently in seven (or eight?) different families or subfamilies, and in each of the major zoogeographical regions. One of these involves a Reduviid, the others are all phytophagous forms; in one, or possibly two, cases it is the male that is concerned; in the others

the female is said to be the guardian. These instances are as follows:

- Scutelleridae: *Tectocoris diophthalmus* (Scutellerinae). Australia, etc.
 (females) *Cantao ocellatus* (Scutellerinae). India to Papua.
 Pachycoris torridus (Tetyrinae). South America.
- Pentatomidae: *Mecadorus griseus* (Acanthosomatinae). Europe, (females) Siberia.
 Phloeophana longirostris (Phloeinae). Brazil.
 ? *Mecistorhinus tripterus* (Pentatominae). Tropical America.
- Aradidae: *Neuroctenus pseudonymus* (Mezirinae). North (males?) America.
- Tingidae: *Gargaphia solani*. North America.
 (females) *Gargaphia tiliae*. North America.
- Reduviidae: *Rhynocoris albopilosus*. Belgian Congo.
 (males)

Formerly, in considering the significance of the brooding habit in *Mecadorus griseus*, as also the egg-carrying habit of the North American *Belostoma flumineum*, it was usual to assume that both of these phenomena had as their aim the protection of the ova from the male of the species, to which were imputed cannibalistic traits plus an extremely voracious appetite. This view, however, has been opposed by several writers and is no longer generally held; and the case of *Rhynocoris albopilosus*, a predatory species, in which the male is the guardian of the eggs, offers direct evidence against this theory. In this connection, it would be interesting to know if, in the other cases enumerated, it is *always* the female that is concerned.

Another explanation, and a more reasonable one, I believe, of these phenomena is the protection afforded the ova against egg parasites. In support of this we have the direct observations of Bequaert and of Ballard and Holdaway, cited above, and the indirect evidence that parasitized eggs are found only at the edges of the egg mass, where they are less effectively covered by the guardian adult, as observed by Ayyar and myself.

III.

In tracing the development of the parental instinct in the Hemiptera, it is difficult to know where to begin. It is a matter of common knowledge that the phytophagous forms, at least, habitually

deposit their ova upon some preferred food plant from which the newly hatched nymphs can extract suitable nourishment upon beginning their independent existence. This can not be cited as a case of parental care, as the parent leaves the scene at once when oviposition is done and has no further care for her young. The curious habits of some Belostomatids whose females attach their ova to the backs of the males must be eliminated, as also the case of the Coreid *Phyllomorpha laciniata*, whose females, according to Jeannel (26) deposit their eggs upon the spinose backs of others of their kind, males or females, indiscriminately. In both of these cases the guardians of the ova are pressed into service to carry the eggs until they hatch; and in the case of *Belostoma flumineum* at least, there is evidence that the male is a most unwilling accessory to incubation.

Bueno (27) has found specimens of *Halobates* with ova attached to the abdomen externally, and Bouvier (28) writes that in these marine Gerridae the eggs "sont réunis sur le dos de la femelle," a statement I have not seen confirmed by any other author. If this unusual, not to say impossible, condition does obtain in *Halobates*, then we should have to consider it as a very primitive type of maternal solicitude, and a phenomenon entirely unrelated to the protection of the ova against egg-parasites. As to the condition described by Bueno, although he writes me that it is of frequent occurrence, I prefer not to consider it at length in view of our scanty knowledge of the ethology of these insects.

T. C. Barber (29) has given us an account of a very interesting performance in the Pyrrhocorid *Dysdercus obscuratus* which evidences an advance toward maternal solicitude on the part of this bug. Eggs are laid in pieces of the preferred food plant, *Sida* sp., which have fallen to the ground, or near such pieces, and the female then covers them with earth, piling dust over the plant tissues and the eggs alike. The first instar nymphs appear to live underground, feeding upon the plant matter provided by the parent, and nymphs of the second instar may do likewise during most of this stage. I did not personally observe any such behavior on the part of the common Paraguayan *Dysdercus ruficollis*, which likewise feeds principally on *Sida* spp., but I do not exclude the possibility of its occurrence as I noted a conspicuous absence of the smaller nymphs on this plant, though older ones, like the adults, were abundant in December and January.

This seems to be the only instance of this sort reported for the Hemiptera, and it is definitely a step forward on the road toward parental solicitude, being comparable to such cases as the Scara-

beid beetles which provide pellets of dung before oviposition so that the larvae are supplied with the food which they will consume during their underground existence, or the solitary wasps which lay their eggs upon their paralyzed prey and then bury them beneath the soil. In none of these, however, is there any actual personal care displayed by the parent toward the young during incubation or early life. The brooding habits of the various species referred to above represent a very great advance over the case of the *Dysdercus*, since here the parents stand guard over the young until they emerge, or even longer.

Similar brooding habits are also observed in the curious Brazilian *Phlocophana longirostris*, a Pentatomid of the subfamily Phloeinae. But here there is still a further advance, in that the female is reported actually to carry her young during their infancy. Heymons (15) reports a parallel case in an Emesine Reduviid of the genus *Ghilianella*, but I have been unable to locate the original reference for this and therefore pass it by without further mention.

The habits of *Phlocophana longirostris* were the subject of a brief account by P. S. de Magalhães (30), first published in a daily newspaper in Rio de Janeiro and reprinted shortly afterward by R. von Ihering (31). The publications where these notes appeared are so inaccessible to most entomologists that I give here an abstract of the account written by Magalhães. It should be noted that he uses the name *Phlea admiravel*, a Portuguese translation of *Phloea paradoxa*, with which species he confused the form under observation. Brien (32) has more recently given an account of the early stages of a "*Phloea paradoxa*," but since I have been unable to see his paper, I can not say whether he was treating of the same species as was Magalhães.

According to Magalhães, the curiously flattened *Phlocophana*, with its broadly explanate and deeply excised margins, so closely resembles a patch of lichens on the tree trunks or branches where it occurs that it is easily overlooked. The Phloeines, like other Pentatomids, have odoriferous glands which secrete highly volatile, non-staining liquids: in some individuals the secretion is most offensive in odor, in others quite agreeable, even in different specimens of the same species taken from a single tree. If these bugs are handled for any length of time, the fingers become almost indelibly stained a rusty yellow color, apparently from the secretion of small glands in the dorsal integument. A most unusual defence reaction is observed in these bugs: if disturbed they eject a jet of clear, limpid liquid from the anal orifice, often to a considerable distance. Only a slight stimulus is needed to provoke this reac-

tion, and even the pressure of a strong wind is sufficient, so that where the bugs are numerous the drops of liquid fall on a windy day like a shower from the trees. This discharge is neutral or very weakly acid in reaction, and is non-irritating even when received on the conjunctiva of the eye. The bug walks only very slowly, with a curious hitching movement of the hind part of the body; and it flies with great reluctance unless it is dropped from a considerable height.

"During the development of the ova," says Magalhães, "from oviposition until hatching, the mother *Phloca* remains steadfast at the point on the bark where they were laid, and covers them with her body." After hatching, the nymphs attach themselves to the venter of the parent and are carried by her for many days. "It is to be presumed that they are fed by their parent," Magalhães continues. "In what way this service is performed, we do not know. The position of the little ones, holding on to the parent, their backs turned to the surface of the tree where the parent lives, and the softness of the rostrum in the newly hatched nymphs, are reasons for supposing that the latter receive their food from the parent. In spite of our interest and our close attention, we could not discover whether the parent spreads over her abdomen the sap she has drawn from the tree, or whether the feeding takes place in some other way. . . . Although delicate, fine and flexible, the rostrum of the adult penetrates deeply through the cortex of the tree in search of the sap which provides its food. It can be withdrawn only with difficulty when in this situation, and the insect may even be left suspended by its rostrum without the latter being pulled from the tree trunk."

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A NOTE ON DYAR'S LAW (LEPIDOPTERA:
LARVAE).

BY WM. T. M. FORBES, Department of Entomology, Cornell
University, Ithaca, New York.

It has been generally recognized that the chitinous parts of the successive stages of an insect tend to increase at each molt in constant ratio. In the caterpillar the most convenient part to measure is the width of the head, and the ratio between head widths at successive molts is known as Dyar's ratio.¹

There is still much room for study of the exceptions and irregularities in this law. A common condition is that one sex should have a stage more than the other, where it is much larger in the adult; and this seems to be the case in the tussock caterpillars (*Hemerocampa*). Another common variation is that one of the regular stages should be omitted, giving a double ratio for one molt and a total number of stages one less; or in contrast there may be an additional stage interpolated, giving a half ratio for two successive molts.² Finally the law may be less rigidly carried out, and we get a variable head size, depending on the food supply or some other unknown factor. The latter group of cases have not been analysed as yet, and cannot be solved by the simple attack of making a few scattered measurements of single larvae, or even carrying a stray larva or two through its series of stages.

A recent paper at last gives us some data on a case of this type.³ The black or greasy cutworm (*Agrotis ypsilon*), which must be carefully discriminated from the black or black army cutworm of

¹ Dyar, *Psyche* v. 420-422, 1890; see also Imms, *Text-Book of Entomology*, 183.

² Dyar gives a striking example of skipped stages in *Psyche* vi 146, 316. *Apatelodes torrefacta* shows the ratio 1.26, which should indicate eight stages: one larva measured had the sizes .65, .8, 1.3, 2.2, 3.3 mm. omitting stages 3, 5 and 7; while another showed the measurements 1.3, 1.6, 2.1, 2.6 and 3.2 mm., showing all the stages in the part of the development obtained. On the other hand, there are many cases of an interpolated stage, *e.g.*, *Stretchia plusiiformis* and *Syneda howlandi* in Dyar's report on Colorado Lepidoptera, *Proc. U. S. Nat. Mus.* xxv: 377. In the former the stages are .4, .6, 1.0, 1.5 (1.8) and 2.3 mm., the next to last stage interpolated in one case, with ratios half the usual; in the latter the series is .4, .6, 1.0 (1.3), 1.5, 2.3 and over 3 mm., the interpolated stage occurring between the normal third and fourth.

³ Satterthwait, *Jour. Agr. Res.* xlii, 517 ff.

the North (*A. fennica*), has a variable number of stages, 6 or 7, rarely 8. We find that specimens with the larger number of molts grow hardly larger (fig. 1), though Satterthwait's tables 6 and 7 indicate that the ones with 7 stages consume from 7 to 10 per cent more food, sex for sex, than those with 6.

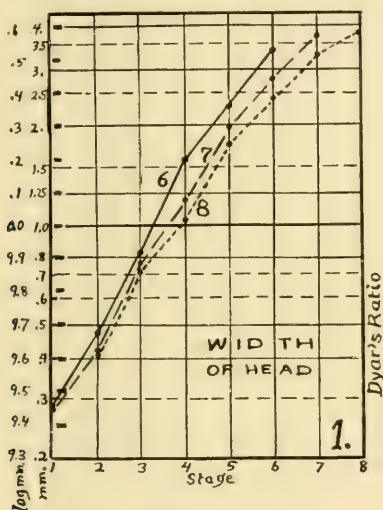


FIG. 1.

In Fig. 1 I have plotted the head-sizes given in Satterthwait's table 1; using a logarithmic scale, so that a straight line will indicate a steady percentage increase in size. It is noticeable that in this case the final size (upper ends of lines) is about the same with all three sets, and that each line is fairly straight, with some falling off at the top, indicating a slower increase in the last 2 or 3 stages. Also the molts are about evenly spaced on each line, indicating that instead of interpolating a stage to make the larger number, or jumping a stage to make the smaller number, each number of stages is foreshadowed from the first molt.

If we plot these ratios (Fig. 2) we find that as before, the ratio of growth is lower for each added stage, but the irregularities are such that the difference in the first three stages may not mean anything. What is striking is a large jump in head-size at the third molt, for those which are only going to have six stages, the head practically doubling in diameter—and a somewhat smaller special increase in the following molt. It appears on the face of the record

that whatever makes the difference between the six and seven stage cycles occurs shortly before the third molt.

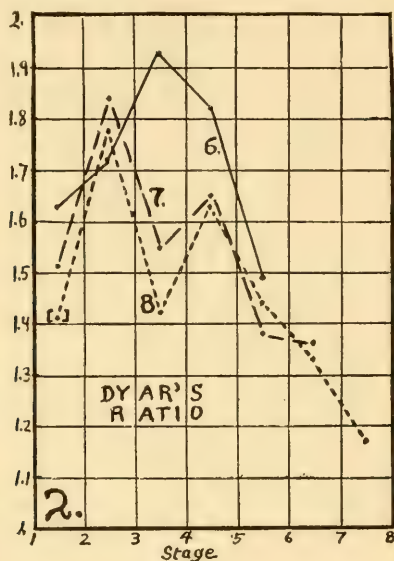


FIG. 2.

Dyar's ratios calculate as follows:

Stage	6 stages	7 stages	8 stages
1-2	1.63	1.51	(1.41)
2-3	1.72	1.84	1.78
3-4	1.93	1.55	1.42
4-5	1.82	1.65	1.63
5-6	1.49	1.38	1.44
6-7		1.36	1.33
7-8			1.17
Average	1.72	1.55	1.45
Av. 1-5	1.77	1.64	1.56
Av. rest	1.49	1.37	1.21

Unfortunately no protocols are given so that it is not possible to say if this jump is due to a general increase of head size in the entire lot, or to the averaging in of a group of specimens that

skipped a molt at this point, with others that skipped one at some later stage.

Both the curve, and the figures of average Dyar's ratios indicate that growth falls off in the later stages (after the fifth). This species has an unusually small egg in proportion to its adult size, and it would appear that the earlier stages show abnormally large increments of growth, while the later ones are more normal. It is considered most typical for an insect to double in volume at each molt, which would indicate a Dyar's ratio of only 1.26; but somewhat higher ratios are more common in the caterpillars. The averages given for the later stages: 1.49, 1.37, 1.21, are within the normal range.

Synonymy of two North American Mycetophilidae (Diptera).—A specimen of *Mycetophila* (*Opistholoba*) *ocellata* Joh. (1912) has been compared by Dr. F. W. Edwards, of the British Museum, with the European *M. caudata* Staeger (1840) and found to be identical. Landrock in Lindner's "Die Fliegen der palaearktischen Region" places *Exechia casta* Joh. (1912) as a synonym of *Exechia frigida* (Holm. 1865).—O. A. JOHANSEN, Ithaca, N. Y.

NORTH AMERICAN PARASITIC FLIES OF THE
GENUS *SPATHIDEXIA* WITH DESCRIPTIONS
OF TWO NEW SPECIES.

BY H. J. REINHARD, College Station, Texas.

This paper contains a discussion of the generic characters of the tachinid genus *Spathidexia*, with a key to the species, four in number, of which two are described for the first time. Types of the new species are in my collection.

Townsend erected the genus on internal characters of the female reproductive system, with *clemonsi*, new, as the type and sole species (Jr. N. Y. Ent. Soc., vol. 20, 1912, p. 110); having previously referred to the intended genus under the number TD371 (Ann. Ent. Soc. Amer., vol. 4, 1911, p. 140). In 1916, he published a brief description of the external characters (Ins. Insc. Mens., vol. 4, p. 23). Perhaps the most striking character of the genus is the unusually long backwardly directed larvipositor in the female. The genus is briefly recharacterized below.

Generic characters, from the type species: Eyes bare, descending almost to vibrissae; cheeks very narrow; length of head at antennae much greater than at vibrissae, which are on the oral margin at lower edge of head; front moderately wide in both sexes with two pairs of proclinate orbitals present; ocellars distinct, proclinate; frontal bristles reaching to middle of second antennal segment; antennae inserted a little below middle of eye, elongate reaching nearly to oral margin, third segment three times longer than the second; arista slender, with short basal segments; parafacials bare, greatly narrowed on lower part; facial ridges diverging downward, bearing a few hairs next to vibrissae; palpi well developed; proboscis short, with a fleshy labella. Thoracic chaetotaxy: acrostichal 3, 3; dorsocentral 3, 3; humeral 3 or 4; posthumeral 3; presutural 1 (outer); notopleural 2; intraalar 3; supraalar 3; postalar 2; sternopleural 1, 1; pteropleural 0; scutellum with two marginal, one small discal and a good-sized decussate apical pair; prosternum and propleura bare; postscutellum normally developed; infrascutal hairs absent. Abdomen without any discal bristles; female with a long flattened retractile larvipositor, tapering shortly before apex which is not very acute, behind with a shallow median groove and in profile rather distinctly bowed from base to tip. Claws and pulvilli in both sexes shorter than apical tarsal segment. Wing rather short and broad, with ordinary venation; first vein bare, sec-

ond setulose to small cross vein; apical cell open shortly before wing tip; costal spine distinct.

KEY TO SPECIES OF SPATHIDEXIA.

1. Abdominal segments two to four with defined silvery bands on base; parafrontals and pleura pale-haired; mesonotum thickly pollinose2
 Fourth abdominal segment wholly polished black, the two preceding ones with thin or changeable whitish pollen on basal margin; parafrontals, pleura, and mesonotum blackish, subshining, and clothed with black hairs; legs black, middle tibia with three anterodorsal bristles (Wisconsin and Ohio).

rasis n. sp.
2. Mesonotal hairs black; parafacials bare3
 Hairs on mesonotum white; parafacials with fine white hairs extending to lower third; arista slender to base, finely pubescent; first abdominal segment with a pair of median marginals; legs black; third vein of wing setulose almost to middle of last section (Ohio) cerussata n. sp.
3. Arista distinctly short-haired; abdominal pollen bands covering the basal third of segments two to four; tibiae reddish; moderate-sized species 6 to 7.5 mm. (New England, Washington, D. C., Kentucky, and Texas) clemonsi Townsend
 Arista microscopically pubescent; last three abdominal segments silvery on basal fifth to fourth; legs wholly black; small species 4 to 5.5 mm. (Texas, Illinois to New England).

dunningii Coquillett

Spathidexia clemonsi Townsend.

Spathidexia clemonsi Townsend, Jr. N. Y. Ent. Soc., vol. 20, 1912, p. 110; Ins. Insc. Mens., vol. 4, 1916, p. 23.

The principal characters of the species have been mentioned in the generic discussion and the key. The larvipositor is a trifle broader, shorter, and more strongly bowed than in *dunningii*. There are 15 females in my collection taken at College Station, from June to October. I have not seen any specimens of the male sex.

Spathidexia dunningii Coquillett.

Thryptocera dunningii Coquillett, Jr. N. Y. Ent. Soc., vol. 3, 1895, p. 54.

Hypostena dunningii Coquillett, Revis. Tachinid., 1897, p. 60.

A small species closely resembling the genotype; the main distinguishing characters are given in the accompanying key. The female larvipositor is about the same, but less distinctly bowed, approximating the combined length of last two abdominal segments

above, in repose the apical fourth to third projecting beyond tip of abdomen. Male genitalia with rather broad outer forceps, the tips rounded and bowed inward; inner forceps divided and delicate beyond the slightly swollen base; penis simple, thickest shortly before apex; fifth sternite with a shallow V-shaped incision behind thence narrowly divided, the lobes bearing a few short brownish hairs.

A long series of specimens, including both sexes, taken at College Station, Texas, from May to October. The host relationships are not known.

***Spathidexia cerussata*, n. sp.**

Male.—Eyes bare, descending to the vibrissae which are at the oral margin; pollen on face, cheeks, posterior orbits, and front dense, silvery-white with a faint yellow tinge near the vertex; front 0.27 of the head width in the one specimen, barely wider at base of antennae; parafrontals clothed with white hairs which extend thinly downward to lower third of parafacials; median stripe dark, narrow, obscured by pollen in most views; inner verticals and two proclinate orbitals strongly developed; ocellars present, divergent and proclinate; frontals in a single row of four strong bristles interspaced with three smaller ones, the lowermost weak at middle of second antennal segment, upper pair large diverging posteriorly, the next two strong bristles reclinate and decussate; antennae about as long as face, basal segments red, third largely black, convex on front edge, nearly four times the length of second; arista blackish, finely pubescent, hardly thickened on basal part, second segment short; parafacials linear on lower extremity; facial ridges bearing one or two hairs next to vibrissae; proboscis short, fleshy; labella and palpi pale yellow; cheek almost linear; back of head blackish, gray pollinose, with pale hairs which become longer and denser downward.

Thorax black, covered with thick white pollen which is uninterrupted on the mesonotum; the latter and pleura clothed with white hairs; scutellum concolorous with mesonotum but the hairs on disk black. Chaetotaxy as in *clemonsi*; postscutellum black, densely gray pollinose; infrasquamal hairs absent; calypters semitransparent, whitish, inner margin of posterior lobe tinged with yellow.

Abdomen slender, tapering evenly from near base to apex, shining black with dense silvery pollen on basal fourth of segments two to four; no discals present, hairs on entire upper surface depressed; two basal segments each bearing a marginal row of bristles which are depressed between the median suberect pair and the larger ones at the sides; third and fourth segments with a marginal row of eight or ten well developed

bristles; venter with some pale hairs at middle of first segment, the pollen bands of last three segments tapering inward to the median line.

Legs black, fore femora thickly white pollinose and pale-haired on hind side; hind tibia not ciliate, the middle pair with one anterodorsal bristle; claws and pulvilli small.

Wings subhyaline; veins bare except third which is setulose almost to middle of last section; fourth vein with a broad evenly rounded stumpless bend, thence oblique to costa narrowing the apical cell which is open shortly before the exact wing tip; hind cross vein joining the fourth a trifle nearer bend than small cross vein; last section of fifth vein fully one-third the length of the preceding section; epaulets blackish; costal spine distinct.

Length, 7 mm. Female not known.

Described from one specimen, Amherst, Ohio, July, 1933 (H. J. Reinhard).

In general appearance the species is very similar to *clemonsi* and *dunningii*, differing from both in having the mesonotum clothed with white hairs, parafacials bearing a few fine but distinct hairs, first abdominal segment with a pair of median marginals, and the third wing vein setulose far beyond the small cross vein.

***Spathidexia rasilis* n. sp.**

Female.—Front at vertex 0.33 of the head width in one specimen, widening slightly downward; parafrontals black and subshining on upper part with denser gray pollen below the middle, clothed with short black hairs; median stripe dark velvety brown, slightly narrower than one parafrontal; inner verticals stout, curving backward; ocellars not very large, divergent and proclinate; frontals above antennae decussate except the uppermost which is directed outward and backward, the preceding pair distinctly reclinate with the lowermost about at middle of second antennal segment; orbitals two, proclinate; face and cheeks dark with moderately shining gray or almost plumbeous pollen; parafacial bare, greatly narrowed on lower part; facial ridges bearing bristly hairs on lower third; vibrissae at level with front edge of mouth; antennae as long as face, third segment black, about two and one-half times the length of second which is red at apex; arista black, slightly thickened on proximal fifth, microscopically pubescent, middle segment short; palpi yellow, thickened apically; proboscis short; labella fleshy, reddish-yellow; eyes bare; cheeks about one-tenth the eye height; back of head black with thin plumbeous pollen and only a few pale hairs on lower margin.

Thorax black, thinly dusted with gray pollen; mesonotum subshining, showing no defined vittae and clothed with coarse black hairs; scutellum black, subshining, at most faintly pruinose; pleural hairs black. Chaetotaxy as in *clemensi*; post-scutellum normally developed; infrasquamal hairs absent; calypters semitransparent, white.

Abdomen polished black, basal edge of second segment with thin gray pollen, which is thicker on basal third of the following segment and interrupted at the middle when viewed from above, fourth without pollen and wholly shining; hairs on upper surface depressed, no discs; first segment without median marginals; second with a large pair besides some distinct bristles at the sides; third with a marginal row of ten or twelve; fourth bearing a similar row of about eight with some smaller bristles between these and the apex; genitalia with a flattened posteriorly directed larvipositor about as in *clemensi*.

Legs shining black; middle tibia with two large bristles and one smaller on outer front side; hind tibia with two good-sized bristles on the inner and outer posterior edge, the rest smaller and uneven; claws and pulvilli short.

Wings subhyaline, with a faint yellow tinge along costal margin; bend of fourth vein rounded, without a stump or fold; apical cross vein slightly arcuate; first posterior cell open just before wing tip; first vein bare, third with hairs extending from base almost to small cross vein; hind cross vein reaching the fourth about two-fifths the distance from bend to small cross vein; last section of fifth vein approximately one-third the length of preceding one; costal spine well developed.

Length, 4.5 to 6 mm. Male unknown.

One specimen without collector's label, Madison, Wisconsin, May 31, 1931 (holotype); and one specimen, Amherst, Ohio, July, 1933 (H. J. Reinhard).

Like the genotype, the species has a backwardly protruding larvipositor but differs from this and the rest of the species by having a blacker and more shining general appearance. Additional differences are mentioned in the description and key.

ON SOME HETEROPTERA FROM THE WEST AND SOUTHWEST.

BY J. R. DE LA TORRE-BUENO, White Plains, N. Y.

I

The bugs collected in the West and Southwest in the course of his trip in the summer of 1933 by Mr. George P. Engelhardt, while naturally limited as to species and numbers, nevertheless contain some interesting forms and new records for the States of Oregon, Washington, Utah and Nevada. All are set forth here, either as confirmatory of published records or as extending the range of some of the forms. The species are typical of the West and South, except for widespread nearctic or palaearctic species, such as *Thyanta custator*, *Eurygaster alternatus*, *Brochymena quadripustulata*, *Elasmostethus cruciatus*, *Harmostes reflexulus*, *Corizus lateralis*, *Lygaeus kalmii*, two *Nysius*, *Geocoris bullatus*, *Emblethis vicarius*, *Sinea diadema*, *Salda interstitialis* and *S. coriacea*, and the very interesting ant-mimic *Orectoderus obliquus*. Characteristically western are: *Thyanta brevis*, *Pentatoma sayi*, *Perillus bioculatus* var. *clanda*, *Alydus pluto*, *Corizus scutatus*, *Geocoris atricolor*, *Ligyrocoris latimarginatus*, *Aradus blaisdelli*, *Nabis lovetti*. However, many of these are new distributional records, as will be noted hereafter.

II.

Eurygaster alternatus Say—Mt. Rainier National Forest, Oregon, 4 specimens, May 5.

Brochymena quadripustulata Fabricius—One from Coleman Lake, Oregon, June 24; seems not heretofore reported from the State.

Thyanta custator Fabricius—Guano Ranch, Nevada, June 24; Lake View, Lake Co., Oregon, June 23.

Th. brevis Van Duzee—Blitzen River, Oregon, June 25; Garfield Co., Utah. New for Oregon.

Th. sp.—A small species something like *brevis*, but not identified. Guano Ranch, Nevada, June 24.

Pentatoma sayi Stål—White Swan, Washington, July 4; Green River, Utah, August 4; Moab, Utah, August 6. These seem to be new records for both States.

Perillus bioculatus Fabricius var. *clanda* Say—Utah Lake, Utah, August 1.

Elasmostethus cruciatus Say—Pine Creek, Baker, Oregon, June 14, 3 specimens of this widespread form.

- Mozena* sp.—St. George, Utah, July 22; this is a common southwestern species not as yet satisfactorily determined specifically.
- Catorhintha guttula* Stål—Westport, Nevada, July 7; one specimen of this species, which does not appear to have been recorded from the State heretofore.
- Alydus pluto* Uhler—White Swan, Washington, July 4, and Pullman, July 11.
- Harmostes reflexulus* Say—Mt. Rainier National Forest, Oregon, July 3.
- Corizus crassicornis* Linné—One from Pullman, Washington, July 13, which appears to be a new distribution record for this holarctic species.
- Corizus scutatus* Stål—One from Grand Pass, Oregon, June 20.
- Corizus lateralis* Say—One from White Swan, Washington, July 4; the common nearctic species.
- Lygaeus kalmii* Stål—Fish Lake, Utah, July 23; Timpanogas, Utah, July 30; Utah Lake, Utah, August 1; Garfield Co., Utah, July 4; Pine Creek, Baker Co., Oregon, July 14; Malheur Pass, Canyon Mts., Oregon, June 26. These are mostly the western var. *angustimarginatus* Parsh.
- Nysius thymi* Wolff—Guano Ranch, Nevada, June 20; Moab, Utah, August 8.
- Nysius ericae* Schilling—Fish Lake, Utah, July 23; Mt. Rainier National Park, Oregon, July 5. The two species above are likewise widespread, holarctic in distribution.
- Ligyrocoris latimarginatus* Barber—White Swan, Washington, July 4. This is a characteristically western species.
- Emblethis vicarius* Horváth—Garfield Co., Utah, July 4, 2 specimens; Newport Beach, Washington, one. I can find nothing to distinguish this from eastern specimens. It seems not as yet recorded from Washington.
- Aradus blaisdelli* Van Duzee—Pine Creek, Baker, Oregon, July 14; one somewhat dilapidated specimen of this western form.
- Reduviolus subcoleopratus* Kirby—Pullman, Washington, July 11.
- Nabis capsiformis* Germar—Provo Lake, Utah, August 8, one specimen of this palaearctic species which seems widely distributed in the nearctic region.
- Nabis lovetti* Harris—Utah Lake, Provo, Utah, August 1; 2 specimens of this species described and reported only from Oregon.
- Pagasa* sp., nymphs—Two from Garfield, Utah, July 4; too young to determine.

Sinea diadema Fabricius—Pullman, Washington, July 4; one specimen.

Apiomerus spissipes Say—Two from Whistler, Alabama, June 11; this is the common southern species.

Orius sp.—Klamath Indian Reservation, Oregon, June 22; there is only one badly dilapidated specimen of this, which is probably our common widespread *insidiosus* Say.

Anthocoris sp.—Mount Timpanogas, Provo, Utah, July 29; the two specimens before me look like the European *nemorum*.

There is in addition one undetermined Anthocorid, from Pullman, Washington, July 13.

Orectoderus obliquus Uhler—One specimen from Mt. Rainier National Forest, July 5. This is the widespread ant-mimic.

Labops hirtus Knight—Mount Rainier National Forest, Oregon, July 5; 5 specimens of this species, which apparently has heretofore been recorded only from Alberta, British Columbia and Wyoming.

There are also eight other species of Miridae, thus far undetermined.

Gerris robustus Uhler—Five specimens from Santa Rita Mts., Arizona, June 14; one a nymph. According to Drake, this is a synonym of *Gerris remigis* Say.

Microvelia sp.—Las Vegas, Nevada, July 21. There are eight specimens of this species, near *americana* Uhler, which I have not yet succeeded in determining to my satisfaction.

Salda coriacea Uhler—One from Mt. Rainier National Forest, Oregon, July 5.

Saldula interstitialis Say—3 specimens of this widespread North American species from Utah Lake, Provo, Utah.

Notonecta lobata Hungerford—Santa Rita Mts., Arizona, June 16; 3 specimens of this typical southwestern form, common in that State.

Notonecta insulata Kirby(?)—Ogden, Utah, July 25; this is the western species, usually so determined.

REGENERATION OF APPENDAGES AND MOLTING
AMONG THE THYSANURABY HARVEY L. SWEETMAN, Massachusetts State College,
Amherst, Mass.

The Apterygota is a very primitive group of insects, none of them reaching the high morphological specialization that is common among the Pterygota. While several species of apterygotan insects are being studied, this report will be confined largely to two species, *Thermobia domestica* Pack., and *Lepisma saccharina* L.¹ The Thysanura, according to Crampton (1928) are among the more advanced of the apterygotan insects. Crampton's classification of the Apterygota will be followed in this paper.

It is well known that the Apterygota are ametabolous in their development, that is, the young are essentially like the adults in structure and undergo no radical morphological changes. While a few structures of the adults are lacking among the newly hatched nymphs, the most conspicuous one is the absence of scales until the third molt when the young nymphs become sparsely clothed with scales.

A common belief among entomologists is that the Thysanura, at least, do not molt directly as most insects do, but that the cuticula is shed in small bits at a time and more or less continuously. However, this is not the case with the species under observation. The molts are definite and complete, even on legs, antennae, and cerci. The cuticula splits along the dorsal midline of the thorax and head, and the insect emerges through this opening leaving the exuvium intact and in one piece, including the appendages. Generally the exuviae are eaten by the newly emerged individuals, or others, shortly after being cast off, except after the first and second larval instars. This habit, which is common among many insects, persisted even though fish meal and dried beef were available in the diet.

The frequency of molting of *Thermobia domestica* and *Lepisma saccharina* depends very much on the rate of metabolism, which in turn is influenced by the environmental conditions; a temperature of 37° C. and a relative humidity of 75 per cent being near the optimum for the former, and a temperature of about 28° and rela-

¹ A more complete report, the results of an investigation covering two years, of the ecology and biology of *Thermobia domestica* is being prepared for publication.

tive humidity of 90 per cent being near the optimum for the latter. Under such conditions, especially with *Thermobia*, molting is frequent with both nymphs and adults. The time between molts is quite variable, but roughly among adults can be expected to occur on an average of 20 to 25 days at 37° and 40 to 50 days at 22° for *Thermobia*. Among the immature stages at 37° the interval between molts, after the first, which occurs when the nymphs are about one day old, gradually lengthens with age from about 5 to 6 days to that of the adult. At 22° the time before the first molt requires approximately 4 days, the second instar requiring about 11 days. The intervals between the last two or three molts preceding death of the adults is frequently shortened and may approximate 10 days.

The number of molts that the Thysanura undergo is indefinite. Spencer (1930) suggests that approximately 14 instars are passed in the immature stages of the fire brat, but some of the specimens under observation by the writer have passed beyond that number and are definitely still immature. The writer knows of no criterion that can be said to definitely indicate maturation, but it is suggested that the length of the ovipositor may furnish a useful measure with the females. The writer has considered specimens definitely adult, once eggs are produced, but oviposition cannot be taken as a criterion since high temperature seems to be essential for egg production although development will occur at much lower temperatures. Size cannot be used as a measure of reaching adulthood as some individuals are much smaller than others when the first eggs are laid, even when reared in identical environments. Since the adults molt throughout life it is evident that no definite numbers of molts can be assigned to a given species.

Apparently it has not been recognized that the Thysanura molt throughout life at frequent intervals, although the Collembola are credited with this phenomenon (Folsom, 1926; Comstock, 1926; Imms, 1929). Metcalf and Flint (1932) make no reference to adult molting of Thysanura and Collembola, and in a table indicate that adult molting does not occur. Imms definitely states that the Collembola and Ephemeroptera are the only forms that molt after maturation. Spencer (1930) reports that apparently *Thermobia domestica* can go through life molting if necessity arises. Wellhouse (1928) states that *Campodea staphylinus* Westw. molts the same as other insects, but may continue to molt after reaching the adult stage. However, Imms following Grassi says, *Campodea* has only a single fragmentary ecdysis during its development. Appar-

ently Spencer and Wellhouse believe that adult molting of these insects is unusual. Sanborn (1919) claims to have worked out the life history of *Lepisma saccharina* in some detail, but makes no reference to the adults molting. Raff (1933) working with *Ctenolepisma lineata* Fabr. speaks of six to seven instars in the life cycle. Folsom (1920) in a general paper definitely states that the Apterygota molt at frequent intervals throughout life and that the number of molts is indefinite. However, in his text (1926) no reference is made to adult molting of Thysanura, while the Collembola and mayflies are so mentioned. Cornwall (1915) in studying a lepidomatid in India, tentatively identified as *L. saccharina*, found that the adults molted as well as the nymphs. The writer (1933) emphasized the fact that normally the Thysanura molt throughout life. Recently Adams (1934) reported molting among the adults of *T. domestica*.

Several writers (Tillyard, Metcalf and Flint, Imms) refer to certain insects as Plecoptera, Odonata, and Ephemeroptera as having 20 or more molts. Imms assigns 23 for mayflies and a single molt for *Campodea* and *Japyx*. My records show that the Thysanura, in certain favorable environments at least, commonly exceed this number. If all this is true the variation among the species of Apterygota in number of molts is far greater than any known cases among the Pterygota.

A few records of the regeneration of appendages are available (Lubbock, 1870; Sanborn, 1919), but apparently it is thought to be confined to the nymphs. The writer has observed regeneration in adults as well as nymphs of the greater portion of the antennae, lateral and caudal cerci, and at least the tibia and tarsi of the legs. Complete regeneration is evident following a molt, unless molting only a few days following injury, and not partial as frequently seen among the Arachnida.

Molting throughout life, after maturation as well as before, is common to the apterygotan insects, crustacea, and chilopods,² and perhaps other groups of Arthropoda. Regeneration of jointed appendages is common throughout the molting periods of apterygotan insects, crustacea, chilopods, diplopods, and arachnids, and perhaps other groups of Arthropoda. The method of fertilization as given by Spencer (1930) for *Thermobia domestica* and, partially confirmed by the writer, is more primitive than is known among ptery-

² The information regarding chilopods and diplopods was furnished through the kindness of Dr. R. V. Chamberlin at the University of Utah.

gotan insects. The males go through a "love dance" performance in the presence of the females, during which a spermatophore is dropped. This later is picked up by the female and the transfer of sperm accomplished. This, according to Spencer, is suggestive of that occurring among the chilopods. These facts are suggestive of a close relationship or, at least, of common ancestry of these arthropodan forms.

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NEUROCOLPUS REUTER: KEY WITH FIVE
NEW SPECIES.

(HEMIPTERA, MIRIDAE)

BY HARRY H. KNIGHT, Iowa State College, Ames, Iowa.

For a number of years the writer has had in mind a careful study of *Neurocolpus* material. Recent work on a monograph of Illinois Miridae has made it necessary that I arrive at some conclusion regarding the variable species, *nubilus* Say and allies. Some results of this study are herewith presented in a key with descriptions of five new species. Good specific characters have been found in the structure of the antennae, while some species differ in the length of rostrum. Three of the new species are recorded from New York and added to the list brings the total number of known Miridae up to 306 species for the state.

: *Neurocolpus tiliae* n. sp.

Allied to *nubilus* Say but distinguished by the relatively longer first antennal segment, also by the longer rostrum which exceeds posterior margins of hind coxae.

♂. Length 5.7 mm., width 2.3 mm. Head: width .996 mm., vertex .476 mm. Rostrum, length 2.55 mm., exceeding posterior margins of hind coxae and touching upon fourth ventral segment. Antennae: segment I, length 1.43 mm., slightly compressed, greatest width .237 mm. near middle, clothed with erect, flattened black hairs, intermixed with erect, slightly longer, simple pale hairs, orange yellow, irregularly marked with reddish to fuscous dots; II, 2.03 mm., slender, becoming clavate on apical third (width .15 mm.), pale, thickened part dark red to blackish; III, .78 mm., yellowish, apical third reddish to black; IV, .74 mm., fuscous. Pronotum: length 1.25 mm., width at base 1.82 mm., basal margin distinctly sinuate on middle.

Dorsal aspect yellowish to orange red, hemelytra with a considerable number of yellowish spots, larger and in part confluent on cuneus; scutellum paler, irregularly marked with dark granulate reticulations; pronotum yellowish, usually darkened by hypodermal reddish granulations, propleura pale, coxal cleft crossed by two irregular dark rays. Membrane fuscous, a rounded spot each side touching margin, discal spot, also bordering cuneus within areoles, paler. Hemelytra clothed with golden, slightly sericeous, recumbent pubescence, intermixed with some simple, pale to fuscous hairs, pronotum with much longer hairs. Body beneath pale to yellowish, sides

of thorax and abdomen darkened with reddish and fuscous, two paler longitudinal lines running through the dark color. Legs pale to yellowish, hind femora darkened on apical half with reddish and fuscous, also provided with a few flattened black hairs; tibiae pale to reddish, not distinctly banded.

♀. Length 5.6 mm., width 2.3 mm. Head: width .996 mm., vertex .476 mm. Antennae: segment I, length 1.47 mm., width .238 mm.; II, 1.95 mm., width of clavate part .173 mm.; III, .86 mm.; IV, .86 mm. Pronotum: length 1.25 mm., width at base 1.77 mm. Very similar to the male in form and coloration.

Holotype: ♂, July 11, 1922, St. Anthony Park, Ramsey County, Minnesota (H. H. Knight); author's collection. *Allotype*: same data as the type. *Paratypes*: 48♂, ♀, taken with the types on *Tilia americana* where the species was breeding. ♀, July 14, 7♂, ♀, July 24, 1924, topotypic (H. H. Knight). ♂, ♀, July 11, topotypic; ♂, July 11, 1921, Lake City (A. A. Nichol). ♂, 2♀, July 12, 1922, topotypic (C. Johnson). IOWA—♂, June 21, ♀, June 24, 1929, Ames (H. H. Knight); on *Tilia americana*. ♀, July 4, 1929, Ames (H. A. Stabe), ♀, July 7, 1931, Traer (Drake & Harris). ILLINOIS—♂, July 17, 1896, Algonquin. 4♀, July 24, 1892, Galesburg (Stromberg). ♀, July 4, 1915, Urbana. ♀, June 8, 1933, Frankfort (Mohr & Townsend). NEW YORK—♂, July 29, 1927, ♂, July 25, 1929. Albany (N. Y. S. coll. A3510).

***Neurocolpus jessiae* n. sp.**

Allied to *nubilus* Say but distinguished by the relatively shorter first antennal segment and by the pale hind femora with black apices.

♂. Length 6.3 mm., width 2.34 mm. Head: width 1.08 mm., vertex .43 mm. Rostrum, length 2.5 mm., extending to near hind margins of posterior coxae. Antennae: segment I, length 1.25 mm., slightly compressed, greatest width (.22 mm.) near middle, the black scale-like hairs only moderately conspicuous, intermixed with a few more erect black bristles, brownish black, closely and irregularly spotted with pale; II, 2.64 mm., slender, distal half gradually tapered to thicker apically, black, basal half more yellowish; III, 1.08 mm., black, pale at base; IV, 1.11 mm., black. Pronotum: length 1.34 mm., width at base 1.95 mm.

Dorsum chiefly black, basal half of cuneus, spots on embolium and scutellum, and more or less broadly on anterior half of pronotum, pale to yellowish; body beneath pale to yellowish, sides of thorax and venter more or less infuscated.

Legs pale, apical one-fourth of hind femora black, front and middle femora reticulate with fuscous apically; tibiae pale, front and middle pair with knees, apices and two narrow rings between fuscous; hind tibiae with basal one-fourth and broad band just below middle, black, apices fuscous; tarsi yellowish, apical segment largely black. Genital claspers not exhibiting evident specific characters.

♀. Length 6.5 mm., width 2.3 mm. Head: width 1.08 mm., vertex .47 mm. Antennae: segment I, length 1.3 mm., moderately compressed, greatest width .22 mm.; II, 2.6 mm.; III, 1.04 mm.; IV, 1. mm. Pronotum: length 1.34 mm., width at base 1.99 mm. Very similar to the male in form and coloration.

Holotype: ♂, July 3, 1921, Hollister, Missouri (Jessie Knight); author's collection. *Allotype*: same data as the type. *Paratypes*: 6♂, taken with the types. 2♂, July 18, 1915, Springfield, Missouri (H. H. Knight). IOWA—♂, July 29, 1928, Ames (H. H. Knight). ♂, July 4, 1929, Ames (H. A. Stabe). ILLINOIS—11♂, 15♀, July 20, 2♂, 9♀, July 24, 1889, Urbana (C. A. Hart), "from panicles of elder fruit"; also two nymphs with the same label which indicates that the species was breeding on this host plant. MASSACHUSETTS—♀, July 29, 1916, Pigeon Cove (Chris E. Olsen). NEW YORK—♀, August 4, 1923, Ithaca (J. L. Buys). MISSISSIPPI—♂, June 8, 1929, Carthage; 2♀, June 13, 1929, Starksville (H. G. Johnston). TEXAS—♀, June 24, 1917, Wharton (H. H. Knight). WISCONSIN—♂, July 14, Madison. ONTARIO, CANADA—♂, ♀, July 12, 1915, Simcoe (H. G. Crawford), "on apple."

Named in honor of my wife who collected the best series of specimens, from which the types are selected.

***Neurocolpus rubidus* n. sp.**

Allied to *nubilus* Say but distinguished by the shorter first antennal segment and in general aspect by the reddish coloration.

♂. Length 6 mm., width 2.1 mm. Head: width 1 mm., vertex .41 mm. Rostrum, length 2.3 mm., just attaining posterior margins of hind coxae. Antennae: segment I, length 1.04 mm., compressed, greatest width (.22 mm.) near middle, reddish, irregularly but closely marked with yellowish, usual flattened black hairs abundant, intermixed with somewhat longer pale to fuscous bristle-like hairs; II, 2.16 mm., slender, gradually thickened (width .12 mm.) on apical half, yellowish, apical half reddish; III, .82 mm., fuscous, pale at base; IV,

.83 mm., black. Pronotum: length 1.12 mm., width at base 1.73 mm., moderately sinuate on basal margin.

General coloration reddish, in dark specimens fuscous appearing on hemelytra; embolium and scutellum with several yellowish spots; membrane dark fuscous, a pale spot each side on margin, veins dark, apical curve of cubitus reddish. Dorsum clothed with golden sericeous pubescence, intermixed with simple pale to fuscous hairs, with distinct black hairs on pronotum. Femora reddish, hind pair with a distinct pale spot above at slightly beyond middle; tibiae yellowish, two narrow reddish rings on front and middle pair, hind pair reddish on middle and basal one-fourth.

♀. Length 6.2 mm., width 2.34 mm. Head: width 1.06 mm., vertex .46 mm. Antennae: segment I, length 1.12 mm.; II, 2.16 mm.; III, .86 mm.; IV, .87 mm. Pronotum: length 1.25 mm., width at base 1.9 mm. Very similar to the male in form and coloration.

Holotype: ♂, August 2, 1915, Batavia, New York (H. H. Knight); author's collection. *Allotype*: same data as the type. *Paratypes*: 6♂, 1♀, taken with the types. ♂, August 1, ♂, August 3, ♀, August 19, 1913; 3♂, 2♀, August 10, 1916, Batavia, New York (H. H. Knight).

***Neurocolpus arizonae* n. sp.**

Color aspect suggestive of *mexicanus* Dist., but distinguished by the short, non-inflated apex of first antennal segment and by the shorter rostrum.

♂. Length 6 mm., width 2.16 mm. Head: width 1.10 mm., vertex .43 mm. Rostrum, length 1.95 mm., only reaching to middle of intermediate coxae. Antennae: segment I, length 1.02 mm., slightly compressed, greatest width (.22 mm.) near middle, simple and scale-like hairs relatively short, brownish black, closely and irregularly spotted with pale; II, 2.64 mm., yellowish, apical third slightly thickened and blackish; III, .64 mm., yellowish, apex blackish; IV, .51 mm., yellowish to fuscous. Pronotum: length 1.27 mm., width at base 2.03 mm.

Hemelytra blackish, embolium and cuneus with pale spots; membrane fuscous, usual pale spots at each side and within base of larger areole, veins fuscous, apical angle of cubitus whitish; scutellum fuscous to black, apex with rather large white spot; pronotum with pale ground, becoming fuscous each side of median line and on collar. Clothed with silvery, sericeous pubescence and intermixed with simple fuscous hairs, also with some golden sericeous pubescence on hemelytra; basal half of pronotum with several tufts of erect black hairs.

Femora brownish black, marked with numerous small dots and spots, tibiae banded with black and pale.

♀. Length 6.6 mm., width 2.47 mm. Head: width 1.12 mm., vertex .476 mm. Antennae: segment I, length 1.21 mm., width .26 mm.; II, 2.51 mm.; III, .69 mm.; IV, .52 mm. Pronotum: length 1.31 mm., width at base 2.08 mm. Slightly more robust than the male and generally somewhat paler in color.

Holotype: ♂, May 10, 1924, Tucson, Arizona (A. A. Nichol); author's collection. *Allotype*: same data as the type. *Paratypes*: 8♂, ♀, taken with the types. ARIZONA—♂, May 9, Salt River Mts., alt. 1300 ft.; ♂, 2♀, May 20, 1928, Empire Mts., alt. 5000 ft.; 3♂, 2♀, May 27, 1928, Rincon Mts., alt. 3300 ft.; ♀, June 7, 1926, Tucson, alt. 4000 ft. (A. A. Nichol). 2♀, May, 1929, Tucson; 3♂, May 9, 1929, Santa Rita Mts. (E. D. Ball). ♀, May 6, 1915, Phoenix (A. K. Fisher). 2♀, April 17, 2♀, April 26, 1916, Sabino Canyon, Santa Catalina Mts. (J. F. Tucker). TEXAS—♂, ♀, April 27, 1932, College Station (J. C. Gaines).

***Neurocolpus johnstoni* n. sp.**

Allied to *mexicanus* Dist., but distinguished by the shorter first antennal segment and by the uniformly reddish brown coloration.

♂. Length 5.8 mm., width 2.12 mm. Head: width 1.06 mm., vertex .40 mm. Rostrum, length 2.46 mm., scarcely attaining posterior margins of hind coxae. Antennae: segment I, length 1.12 mm., greatest width (.28 mm.) at the moderately inflated apex, with pale bristles among the erect, black scale-like hairs, reddish brown with paler markings; II, 2.29 mm., gradually thickened from base to .13 mm., near apex, pale yellowish, reddish brown on apical third; III, .75 mm., pale to fuscous apically; IV, .69 mm., blackish. Pronotum: length 1.21 mm., width at base 1.73 mm.

General coloration rather uniformly reddish brown, apex of scutellum yellowish white, body more reddish beneath. Dorsum clothed with silvery, sericeous pubescence and intermixed with pale and blackish simple hairs. Femora reddish, hind pair darker, irregularly marked with paler spots; tibiae pale, hind pair reddish on basal fourth, with an obsolete fuscous band beyond middle, front and middle tibiae with narrow reddish ring at middle of basal half; tarsi blackish, paler at base.

Holotype: ♂, September 10, 1930, College Station, Texas (H. G. Johnston), collected in light trap; author's collection. *Paratype*: ♂, taken with the type; collection of H. G. Johnston.

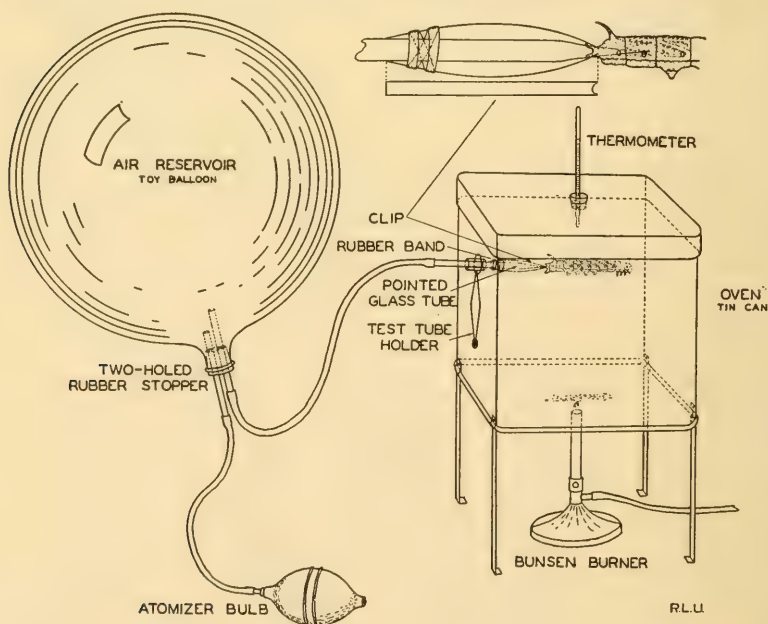
KEY TO SPECIES OF NEUROCOLPUS.

1. Antennal segment I widest at the inflated apex 2
 Antennal segment I not wider at apex 4
2. Rostrum just attaining hind margin of middle coxae; color uniformly yellowish or fulvous *simplex* Van D.
 Rostrum surpassing the middle coxae; otherwise colored 3
3. Antennal segment I just equal to half the length of segment II; uniformly dark reddish, apex of scutellum white or yellowish. **johnstoni** n. sp.
 Antennal segment I equal to three-fifths the length of segment II; coloration varied with fuscous and black. *mexicanus* Dist.
4. Antennal segment I three-fifths or more the length of segment II 7
 Antennal segment I not or only slightly exceeding one-half the length of segment II 5
5. Hind femora pale, apical one-fourth black **jessiae** n. sp.
 Hind femora fuscous or reddish on basal half 6
6. Antennal segment I equal to or slightly greater than half the length of segment II; femora and first antennal segment chiefly reddish and irrorate with paler **rubidus** n. sp.
 Antennal segment I not equal to half the length of segment II; femora and first antennal segment chiefly brownish and irrorate with pale **arizonae** n. sp.
7. Antennal segment I nearly equal to three-fourths the length of segment II; rostrum exceeding posterior margins of hind coxae **tiliae** n. sp.
 Antennal segment I not equal to more than two-thirds the length of segment II; rostrum not exceeding posterior margins of hind coxae *nubilus* Say

METHODS AND TECHNIQUE.

A Simple Device and Method for Blowing Insect Larvae.

—The problem of adequate preservation of material has always been a serious one to entomologists who must collect perhaps a greater variety of forms than workers in any other single field. Amateurs, experimental workers under field conditions, and instructors who must carry on where the advantages of a large, well-equipped laboratory are not available must all make the most of what material they have at hand. While engaged in field collecting of red-humped, tomato worm, and other caterpillars the authors evolved the following modification of the usual method of larval blowing. The merit of this method lies not in originality of principle, for entomologists have inflated larvae with air and dried them in this condition for many years. Nor is there anything original in the idea of filling such specimens with some material in order to make them more solid and permanent. The purpose of the authors has been to accomplish certain desired results, namely, reasonably permanent preservation of soft-bodied caterpillars, etc., in a condition as nearly approaching their natural appearance as possible,



A SIMPLE DEVICE FOR BLOWING INSECT LARVAE

using only material which was on hand at the time and which would be available to a worker under practically any conditions (see figure 1).

A two-holed rubber stopper, through which two short pieces of glass tubing have been forced, is put in the mouth of a toy balloon. To one of these pieces of glass tubing is attached a rubber tube leading to an atomizer bulb which has a check valve at each end. To the other is attached a rubber tube leading to the oven. A piece of glass tubing is heated over a flame, drawn out to a fine capillary, and then broken at this point. Inserting this latter piece at the end of the rubber tube and fastening two clips (two pieces broken from a clock spring or two paper clips will do nicely) to the tip by means of a rubber band completes the essential part of the apparatus. The clips will hold the larva much more securely if their tips are notched with a rat-tail file (see inset). A caterpillar may now be prepared by inserting a dissecting needle in the anus to break the membrane and then rolling from head to anus using a pencil or some other round object. When the body contents have been entirely evacuated the skin may be fastened to the small apex of the glass tube by means of the aforementioned clips. Air is pumped into the reservoir (balloon) with the atomizer bulb and a continuous source of air is thus established which will keep the larva inflated for ten minutes or more.

For the "baking," heat from electric light bulbs was first used, the tube with its fully extended and inflated larva being held near a lamp. This necessitated frequent turnings to insure uniform drying on all sides and often resulted in burning of the specimen. Finally a tin can was substituted, being used as an oven, with one or more holes cut in its side to admit the specimens and a test tube holder soldered below each hole to hold the glass tube. Any heating element, bunsen burner, gas stove, etc., is satisfactory. A thermometer inserted through a hole in the top of the can aids in maintaining an even temperature (about 70° F. is best for most larvae).

After inflation and drying it was found that the dry, brittle skin of the caterpillars was not only very fragile but, in many cases, not even the same color as in nature due to the absence of the coloring matter of the body fluid. Both of these conditions may be overcome by melting paraffine (paraffine with a high melting point will be found most satisfactory) and adding pieces of children's Crayola of various colors until a shade is obtained which is similar to that of the body contents. A medicine dropper is heated, the above mixture drawn up, and then injected into the open anus of the larva.

If any paraffine remains visible at the anus after the whole body cavity has been filled it will soon be drawn in due to the shrinking of the paraffine and will leave no trace of the inner filling.

Specimens preserved in this manner have remained unchanged, even with rather rough treatment, for two years and appear to be satisfactory in every way.—A. S. HARRISON AND R. L. USINGER, Berkeley, California.

A NOTE ON HIBERNATING QUEENS OF THE WASP, *VESPA MACULATA*.

PHIL RAU, Kirkwood, Mo.

I failed on many occasions successfully to carry through the winter the queens of the bald-faced hornet, even though I placed them in cages out of doors during the winter. Finding twelve queens hibernating in three fallen logs at Rankin, Missouri, on November 9 and December 5, 1931, gave me first-hand information of the conditions under which they naturally hibernate.

The queens had dug pockets for themselves in the moist and rotten logs in which to spend the winter. All three trunks were near a creek bed, on a very shady slope, and even though the days were comfortably warm when examination was made, the soft, rotten pulp in the interior of the log was moist and cold. This then is the method of successful hibernation; the selection of a "hibernacle" that is sufficiently moist and located so that it is not easily influenced by the rising temperature of an occasional warm day in the midst of winter. The positions of the logs on the slope were such that intermittent warm days would not affect the temperature of the interior of the log, and thereby not arouse the queens to premature activity.

The queens were not hibernating in ready-made galleries, but had actually made their own; in one case a pile of freshly bitten chips on the ground under the pocket was evidence that she had done her own work. In most cases one queen was in each pocket, but in two instances I found two queens in each pocket. Queens of *Polistes* wasps, and also of Bumble-bees select the same locality or are attracted to the same spot by the presence of the other queens of their respective species; in one of the above logs in an area of six square inches, I found six queens of *V. maculata* hibernating independently in as many pockets.

The secret, in all probability, for the successful hibernation of *maculata* queens seems to be cold and very moist conditions; with

this knowledge one ought therefore to be able to solve some of the problems of hibernation by experimenting with them in the laboratory under similar conditions.

THE WASP, *VESPA MACULATA*, STALKING PREY.

PHIL RAU, Kirkwood, Mo.

One often sees the workers of the bald-face hornet swoop down upon a resting fly, pick it up without alighting, carry it to a nearby twig, where they remove a wing or two and readjust the body preparatory to a flight to the nest. I was therefore very much surprised to see at Iron Mountain Lake, Missouri, August 30, 1931, a worker of this species actually stalking its prey. On a small pad of semi-hard animal excrement that was almost as black in color as the wasp, a worker quietly took its position. As soon as a fly would alight upon it, she would pounce at it and carry it away. Returning again and again she would assume the same waiting position which frequently led to success. She missed many in her attempts, and the flies got away, although when I amused myself by dropping newly killed flies on the pad, she grabbed them quickly and almost before they landed.

Stalking prey in this manner is a new and different way for this species to get food, and this new habit undoubtedly had its inception in the disappointments that the worker had when too many flies got away from her when she used the old method of swooping down on them from the air. Now certain Hemiptera lie in ambush for their prey, but since they consume their food then and there, their behavior seems to me to be lower in the scale of psychic development than the ambush habits of the wasp. The wasp must remember to return to the same spot, and she must also remember (against her instinctive equipment to do pouncing) that stalking brings results.

It is also of interest that, even though she made a dozen or more trips to the food supply, she did not communicate the good fortune to her sisters, and she alone returned. This is the same type of behavior observed for *Vespa germanica*, where one lone individual spent several days gathering chalcid flies from the clay bank without bringing others with it.¹

¹ Ecology of a Clay Bank. Trans. Acad. Sci. St. Louis, 25: 212, 1926.

PROCEEDINGS OF THE SOCIETY.

MEETING OF FEBRUARY 15, 1934

Minutes of the previous meeting—January 11, 1934— read and approved.

Members present: Mr. W. T. Davis in the chair, Ballou, Cooper, Engelhardt, Lacey, Moennich, Nicolay, Rau, Sheridan, Shoemaker, Torre-Bueno, Wilford, and Wurster. Visitors 3, Mrs. Moennich, Hans Hecher, Geo. Lipsey.

The Treasurer reported for January.

Report of Publication Committee by Mr. Torre-Bueno. Long and too specialized articles not of general interest will be cut out in the future. The outlook for *Entomologica Americana* is good. Articles of unusual excellence are at hand. For the next issues of the BULLETIN he has ample papers. The annual report for 1933 will be of historical nature, showing the growth of publications over 21 years. It will be printed in full.

Mr. Engelhardt proposed for honorary membership Mr. Chas. Schaeffer. He was unanimously elected by a rising vote.

Mr. Davis reported that a ♀ walking stick, *Diaperomera femorata* Say was collected by Mr. Roy Latham at Orient, Long Island, on September 2, 1933. Several records from the Eastern end of Long Island are given in the N. Y. State List of Insects, but so far the species has not been reported from elsewhere on L. I.

Mr. Engelhardt reported on collecting in Oregon and Washington. He worked out five new life histories on Aegeridae or Clearwing moths. His report will be printed in full.

Mr. Wurster showed 10 variations of *Samia cecropia* L., one ♀ with perfectly black margin.

Adjourned at 10.20 P. M.

FREDERICK LEMMER,
Secretary pro tem.

MEETING OF MARCH 15, 1934.

Minutes of the previous meeting (February 15) read and approved.

Members present: Mr. Davis in the chair, Messrs. Angell, Ballou, Cooper, Engelhardt, Lacey, Moennich, Nicolay, Rau, Sheridan, Shoemaker, Wilford, Wurster, and Lemmer, and two visitors.

Mr. Engelhardt reported as Treasurer.

Mr. Engelhardt proposed for membership Mr. Frank W. Parker, Globe, Arizona.

Mr. Wm. Beutenmueller passed away on February 24, 1934. He was a charter member of the Brooklyn Society. Mr. Engelhardt

conveyed the sympathy of the Society to Mrs. Beutenmueller and sent a flower piece. Mr. Davis showed three volumes of Mr. Beutenmueller's papers.

Mr. Cooper read a letter from Mr. Ralph Hopping, who complains about the way new subspecies, forms, variations, etc., are described, which quite often have to be sunk into the synonymy. The discussion was by Messrs. Davis, Nicolay, and Lacey.

Mr. Rau thinks that the European elm beetle may be one of the causes for spreading the Dutch elm disease.

Mr. Ballou made an address devoted to the Coleopterous family *Histeridae*. He spoke concerning the general details of the family's classification, mentioning the divisions of the family into the various subfamilies and tribes, with remarks as to the various modifications of the individual genera and species in order to properly adapt them to their diversified life histories.

The *Hololeptinae* in all instances are species living under the bark of trees and in such situations where the body form required insects being very thin. The members of this group are found in all parts of the globe.

The *Trypanacinae* and *Trypeticinae*, subfamilies found, respectively, in the tropical zones of the Western and Eastern Hemispheres, are modified so that their body form is cylindrical. This enables the adult beetle to burrow into the wood of trees in the burrows and grooves of such wood-boring insects as they prey upon. In some parts of the world, although little appreciated, these groups really accomplish considerable good in killing both the larvae and adults of the wood-boring insects which due to their habits are somewhat successful in avoiding Hymenopterous parasites.

The *Abracinae*, consisting mostly of very small species, were mentioned. The species of this subfamily are found under bark, in decaying vegetation, and even in the nests of birds and small rodents burrowing in the ground.

The *Saprininae*, a large subfamily, are found on all continents. The species are of normal shape, none of them being curiously modified as those of some of the other groups. The species are found, with few exceptions, at carrion, in excrement, and decaying vegetable matter, where it is supposed that they are predaceous upon the larvae of such insects which might be found there. In one genus, *Gnathoncus*, some of the species are found only in birds' nests.

The *Dendrophilinae* consist of species found under bark and in decaying vegetation. The species are usually small, black in color, and have no outstandingly modified individuals or groups.

The *Histerinae*, which are divided into four tribes, *Tribalini*, *Platysomini*, *Histerini*, and *Exosternini*; where there are many instances of modifications to suit the insect to its environment. Some are typically Histerid-like in form, being convex, oval and black in color. Others, found under the bark of trees and greatly flattened, appearing sometimes exactly like specimens belonging to the subfamily *Hololeptinae*. Some, too, are cylindrical, enabling them to enter the burrows of the wood-boring insects of the sections of the world where they are found. Some examples of groups found in the tropical sections of the world are brilliantly metallic in color. In a very few cases, the species are the guests of ants.

And the *Hetaerinae* comprise, to the general entomologist, the most interesting group of the entire family. In this subfamily most of the *Histeridae* of the world, which are called "ant guests" are found. Their bodily structure is curiously modified to protect them from any of their hosts which might become annoyed at the guest. The legs are flattened and so retractile that when folded close to the body they become to a great extent a series of shields. In some species they have glands on thoracic processes, the excretions of which are supposed to somewhat compensate for their being taken care of by the ants. In South America and Australia the species are very numerous, while in other parts of the world the species are few. All of these are difficult to collect, and the average collection discloses only a few individuals.

The family, in the world, contains approximately 3,200 known species, of which less than 500 are found in North America. Mr. Ballou presented two boxes of specimens showing examples of all the subfamilies and the tribes, with many of the curiously modified species found in various parts of the world.

Adjourned at 9.55 p. m.

FREDERICK LEMMER,

Secretary pro tem.

MEETING OF APRIL 12, 1934.

President Wm. T. Davis in the chair and the following members present: Messrs. Angell, Cooper, Eisenhardt, Engelhardt, Lacey, Moennich, Ragot, Rau, Sheridan, Torre-Bueno, Wilford, Wurster, Lemmer, also 3 visitors.

Minutes of the previous meeting read and approved.

Elected to membership: Mr. Frank W. Parker, Globe, Arizona.

Mr. Bueno showed: Recent Advances in Plant Viruses, by Kenneth Smith. Mr. Bueno thinks that no diseases are carried to humans from plants but that diseases are carried from plant to plant.

Mr. Angell records *Sylpha inequalis* from Englewood on April

1st. He showed 2 boxes of stag beetles, including *Lucanus elaphus* var. *carlingi* Angell. Type.

Mr. Bueno showed a box of Hemiptera.

Mr. Lacey showed a variety of showy insects from different orders and from different parts of the world.

Mr. Engelhardt showed 3 boxes of very showy butterflies from Africa (Cameroons).

Mr. Cooper showed a box of *Dytiscus*.

Adjourned at 10.08 p. m.

FREDERICK LEMMER,
Secretary pro tem.

PUBLICATIONS OF THE BROOKLYN ENTOMOLOGICAL SOCIETY.

Explanation of all Technical Terms Used in Entomology.

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EXCHANGES

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

COLEOPTERA.—Am interested in exchanging Coleoptera. Carl G. Siepmann, R. F. D. No. 1, Box 92, Rahway, N. J.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa*, *macaria*, *mormonia*, *malcolmi*, *nokomis*; *Melitaea neumoegeni*; *Lycaena speciosa*; etc. Send lists. Dr. John A. Comstock, Los Angeles Museum, Exposition Park, Los Angeles, Calif.

CATOPINI: *Catops* (*Choleva*), *Prionochaeta*, *Ptomaphagus*.—Wanted to borrow all possible specimens of these genera from North America for a revisional study. Correspondence solicited.—Melville H. Hatch, Dept. of Zoology, Univ. of Wash., Seattle, Wash.

HISTERIDAE.—Desire to obtain material, all localities, for identification, by purchase or exchange of other families. Chas. A. Ballou, Jr., 77 Beekman St., New York, N. Y.

LOCALITY LABELS.—60c per 1000, 5 in strip, 1 to 3 lines. 5 sizes type. 3½ point, 75c per 1000. Good heavy paper. Prompt service. A. L. Stevens, 691 Culver Rd., Rochester, N. Y.

BUY OR EXCHANGE: Pinned Microlepidoptera and papered Pieridae of North America. Full data with all specimens. Named material of all groups offered. Alexander B. Klots, College of the City of New York, New York City.

WILL COLLECT for cash all ORDERS OF INSECTS, providing I receive sufficient orders prior to collecting to justify my proceeding. Have many specimens in stock at all times for sale. Louise Knobel, Hope, Arkansas.

Vol. XXIX

DECEMBER, 1934

No. 5

BULLETIN
OF THE
BROOKLYN ENTOMOLOGICAL
SOCIETY

NEW SERIES



PUBLICATION COMMITTEE

J. R. de la TORRE-BUENO, Editor

CARL GEO. SIEPMAN

GEO. P. ENGELHARDT

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BULLETIN

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THE NORTH AMERICAN SPECIES OF *TRIGONURUS* MULS. ET REY (COLEOPTERA- STAPHYLINIDAE)

BY EDWIN C. VAN DYKE, University of California,
Berkeley, California.

The Staphylinid genus *Trigonurus* was established by Mulsant and Rey,¹ for the reception of *mellyi*, a peculiar flat species found in the Grand-Chartreuse of the Maritime Alps of Europe. Since that time, seven other species have been described. One of these, *asiaticus* Riche, was found in the Caucasus. The other six have been collected on the Pacific Coast of North America.

Of the American species, *subcostatus* Makl,² was described as from Sitka, Alaska and in the genus *Latrimaeum*. It was later removed from that genus and placed in *Trigonurus* and stands as such in the Leng Catalogue, though referred back to its original genus in the 1933 supplement to the Staphylinidae of the Coleopterorum Catalogus. I believe that this species is a true *Trigonurus* and quite close to *crotchii* Lec. if not identical. Its status, however, will have to remain in doubt until we are able to again collect in its type locality. Of the other species, two, *caelatus* and *crotchii*, were collected by Crotch and described by Le Conte³ in 1874; and the remainder, *edwardsi*, *leconteus* and *rugosus*, collected by Henry Edwards and described by Sharp⁴ in 1875. Fauvel⁵ in 1878 reviewed Sharp's work but added no new information. Keen⁶ in 1895 mentions another species, *nebrioides* Fauv., from the Queen

¹ Ann. Soc. Linn. Lyon X, 1847, p. 515.

² Bull. Mosc. 1852, p. 320.

³ Trans. Amer. Ent. Soc., v. 1874, p. 48.

⁴ Entom. Month. Mag., XI, 1875, pp. 205-206.

⁵ Bull. Soc. Linn. de Norman., 3rd ser., II, 1877-1878, pp. 185-188.

⁶ Can. Ent., 27, 1895, p. 172.

Charlotte Islands but this was never described as far as I can find and thus is without standing, a *nomen nudum*. The species, moreover, was no doubt *crotchii* for Keen in 1905⁷ lists this species when mentioning the insects collected on the mainland of British Columbia across the straits from the Queen Charlotte Islands.

Considerable confusion has existed in the minds of entomologists for some time with regard to the status of a number of these species. I have attempted to settle this, first by gathering as much information as I could in the field and second by studying the original types. I have examined the Le Conte types several times and recently had the opportunity to study the Sharp types in the British Museum. As a result of my work, I now consider that *leconteus* Sharp is an absolute synonym of *crotchii* Lec.; that *edwardsi* Sharp is a good species though superficially much like *caelatus* Lec.; and that *rugosus* Sharp is somewhat closely related to *caelatus* Lec., undoubtedly a derivative of the same stock, but for the present should be considered as distinct. In addition to the above I have one more species to add to the number of known species.

The species of *Trigonurus* in North America are as stated before, restricted to the Pacific Coast. They extend along the coast from Sitka, Alaska, to below Monterey, California, and inland range through the Cascade and Sierra Nevada Mountains. No species has been found in the Rocky Mountains or farther east. Their biology is but little known though all of the American species are found in the adult state beneath the bark of dead and decaying coniferous trees.

SYNOPTIC KEY TO TRIGONURUS

1. Prothorax distinctly, arcuately dilated at middle, elytra arcuately narrowed towards base. *dilaticollis* n. sp.
Prothorax and elytra with sides almost straight and parallel. 2
2. Elytral striae well impressed, the strial punctures of but moderate size and strictly limited to the striae; prothorax about one fifth broader than long, the propleura smooth.
crotchii Lec.
Elytral striae shallowly impressed at most, the punctures large and more or less indenting the intervals; prothorax almost as long as broad, the propleura more or less coarsely punctured 3
3. Pronotum finely, shallowly punctured on disk, more coarsely in basal impressions; scutellum smooth or but finely and sparsely

⁷ Can. Ent., 37, 1905, p. 297.

- punctured; elytra without striae but the punctures coarse and arranged in regular rows throughout. *edwardsi* Sharp
- Pronotum coarsely punctured or rugose on disk as well as in basal impressions; scutellum coarsely punctured; elytral punctures moderately coarse and with tendency to be less regularly arranged in rows, at least towards sides. 4
4. Pronotum coarsely but irregularly punctured, the median pronotal groove distinctly impressed and with boundaries generally more irregularly and sparsely punctured than rest of disk; the elytral striae and strial punctures in general quite regular *caelatus* Lec.
- Pronotum coarsely, closely, reticulately punctured or rugose throughout, the median groove vague; the elytral striae irregular or obliterated and strial punctures likewise quite irregularly arranged; general appearance duller than in preceding species *rugosus* Sharp

***Trigonurus dilaticollis* n. sp.**

Elongate, flattened, gradually narrowed from the middle towards both head and apex of abdomen, glabrous, subopaque, dark reddish brown with clypeus and appendages rufous. Head with front rather finely, not closely punctured, the clypeus more finely and sparsely so, the front convex, eyes and genae moderately prominent; antennae long, reaching well beyond hind angles of prothorax. Prothorax nearly a third broader than long, apex perceptibly emarginate, base barely arcuate, sides broadly and evenly arcuate from front angles to near base where sinuate to hind angles; disk slightly convex, broadly, shallowly, longitudinally grooved at middle, deplanate laterally, with lateral basal impressions broad, well impressed and extending forwards to middle, the general surface rather coarsely, closely and uniformly punctured, scutellum similarly punctured. Elytra less than twice as long as broad, a bit broader at humeri than prothorax, sides arcuate from base to humeri, thence almost straight and somewhat convergent to hind angles, the apex of each elytron slightly arcuate; disk flattened from suture to humeral interval which is bluntly carinate, thence abruptly declivous to lateral margin, a short blunt carina near outer apical angles and distinctly impressed within this, the striae moderately impressed and regular and with rather large, regularly placed shallow punctures, finer and more irregular on lateral declivity, the intervals sparsely, irregularly punctured and more or less rugulose. The apical abdominal segments above regularly but not closely punctured. Beneath coarsely, closely punctured in front on both sternum and propleura, more sparsely at middle, and more finely and sparsely on abdomen. Length 6 mm., breadth 1.75 mm.

Holotype male (No. 3850 Calif. Acad. Sci.), a unique collected by myself in Lagunitas Canyon, Marin Co., Calif., April 9, 1911, from beneath the bark of a dead redwood tree, *Sequoia sempervirens* Endl.

This species is not only larger, darker and duller than our other species but has an entirely different appearance because of the dilated prothorax and narrowing of the elytra towards the base.

Trigonurus crotchii Le Conte

Elongate, subparallel, flattened, shining, reddish brown in color. Head sparsely, irregularly punctured, eyes moderately prominent, antennae reaching several segments beyond hind angles of prothorax. Prothorax almost a third broader than long, apex slightly emarginate, base barely arcuate, sides evidently arcuate anteriorly, thence almost straight or barely arched to hind angles; disk flattened, a bit convex at center and finely longitudinally grooved at middle, the lateral basal impressions shallow but rather sharply defined, the general surface finely, regularly and not closely punctured. Scutellum smooth or with but a few, sparsely placed punctures. Elytra somewhat longer than broad, subequal to prothorax in breadth or barely broader, the sides almost straight and parallel from base to apex, the apices of each elytron somewhat arcuate; disk flattened, obliquely declivous near side margins, a short lateral carina near hind angles, the striae distinctly impressed and with closely placed, moderate sized punctures generally limited to the striae, the intervals very finely, sparsely punctured. The apical abdominal segments rather finely, sparsely punctured at upper surface. Beneath, coarsely punctured in front except on propleura which are smooth, more finely and sparsely punctured behind. Length 4.5-5.5 mm., breadth 1.5 mm.

This very distinct species may be recognized by its shining appearance, bright reddish brown color, flatness, rather finely punctured pronotum, smooth propleura and well defined elytral striae. It is a coastal species found from southeastern Alaska through British Columbia, Washington, Oregon and California as far south as Carmel, Monterey County. It has been taken from beneath the bark of the Bishop pine, *Pinus muricata* Don. at Inverness, Marin Co., Calif., and the Monterey pine, *Pinus radiata* Don. at Carmel, Monterey County, California.

Trigonurus edwardsi Sharp

Elongate, subparallel, slightly convex above, shining and rather dark reddish brown in color. Head sparsely, somewhat

coarsely and irregular punctured in front, the eyes moderately flattened, much less prominent than in *crotchii*, antennae extending several segments beyond hind angles of prothorax. Prothorax perceptibly broader than long, apex emarginate, base barely arcuate, sides arcuate and narrowed from near middle to apex, straight and parallel behind; disk somewhat convex, the median sulcation well defined and lateral basal impression broad and distinctly marked, the general surface rather finely, regularly, but not closely punctured at middle and in front, though rather coarsely, closely punctured at base and in basal impressions. Scutellum smooth or finely, sparsely punctured at most. Elytra about a fifth longer than broad, broader at base than prothorax, with sides almost straight and slightly convergent from base to apex, the apices of each elytron arcuate; disk moderately convex and evenly rounded off at sides, not subcarinate, though with short and blunt carinae near hind angles, the striae not impressed but the punctures large, approximate and regularly arranged in rows, the intervals impunctate. The apical abdominal segments moderately coarsely, shallowly punctured above in front near elytra, more finely towards apex, the general surface also finely alutaceous. Beneath coarsely punctured in front and more finely behind, the propleura punctured inwardly but more or less smooth outwardly. Length 4.5–5.5 mm., breadth 1.5–1.75 mm.

This species according to its characters as well as its distribution would have to be placed as an intermediate between *crotchii* and *caelatus*. With the former it shares the finer pronotal punctuation and comparative smooth scutellum. The propleura are also partially smooth. With *caelatus*, it shares the compact slightly convex body and large elytral punctures. Its own peculiar features are the poorly developed eyes, practical absence of elytral striae and very large regularly arranged elytral punctures. It is also a coastal species. I have collected it at Port Angeles, The Forks and Seattle, Washington; Hydesville, Humboldt Co., Guerneville, Sonoma Co., various places in Marin Co., and have studied specimens from Santa Cruz, Calif., collected by Mr. E. P. Van Duzee.

Trigonurus caelatus Le Conte

Elongate, subparallel, flattened, moderately shining, reddish brown in color. Head coarsely, irregularly punctured, eyes moderately prominent, antennae reaching beyond hind angles of prothorax. Prothorax slightly broader than long, apex slightly emarginate, base barely arcuate at middle, sides rounded in front and straight and parallel behind; disk somewhat convex, with distinct median longitudinal impression,

well defined lateral basal impressions and coarsely, closely and rather regularly punctured over entire surface. Scutellum coarsely punctured. Elytra at least one-eighth longer than broad, base a bit broader than base of prothorax, the sides almost straight and parallel or just perceptibly arcuate, the apices evidently rounded; the disk slightly convex, declivous at sides and faintly carinate only at humeri and near hind angles, the striae faintly impressed and with large, rather closely placed punctures which are more or less regularly arranged in rows on front but with a tendency to become slightly irregular at sides and behind, the intervals uneven and with a few scattered minute punctures. The apical abdominal segments, moderately coarsely, closely and somewhat aciculate punctured. Beneath coarsely punctured in front on the propleura as well as sternum, more finely and shallowly punctured behind. Length 5.5-6 mm., breadth 1.5-1.75 mm.

This species is the characteristic species of the Sierra Nevada Mountains, found everywhere under the bark of the yellow pine from Shasta County to Tulare County. Its distinctive features are its coarsely, rather regularly punctured pronotum and elytra, the coarsely punctured scutellum and propleura, elongate parallel form and slightly convex upper surface.

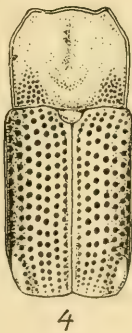
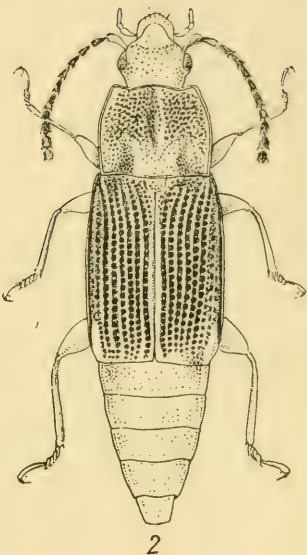
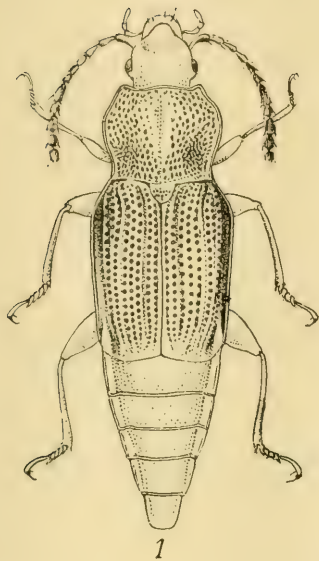
Trigonurus rugosus Sharp

Similar to *Trigonurus caelatus* Lec. but with the pronotal punctures larger, more approximate and confluent as well as the general surface quite rugose and subopaque; and the elytra with the striae poorly defined except towards base and the punctures more or less irregularly disposed and anastomosing, the intervening areas also more or less irregular and rugose, and the general surface somewhat dull as a consequence.

This insect which seems to be confined to the mountains in the neighborhood of Mt. Shasta, California, may prove to be but a subspecies of *caelatus*. So far, it stands apart and should be considered as distinct until we can find specimens from presumed intermediate territory which bridge the gap between the two.

EXPLANATION OF PLATE VIII.

- Fig. 1. *Trigonurus dilaticollis* n. sp.
- Fig. 2. *Trigonurus caelatus* Le Conte.
- Fig. 3. Prothorax and elytra of *Trigonurus crotchii* Le Conte.
- Fig. 4. Prothorax and elytra of *Trigonurus edwardsi* Sharp.
- Fig. 5. Prothorax and elytra of *Trigonurus rugosus* Sharp.



INCISALIA IN SOUTHERN MASSACHUSETTS, 1933.

BY W. PRESCOTT ROGERS, Fall River, Massachusetts.

Five species of this genus were taken during April and May, 1933, within a radius of fifty miles of Fall River. Localized, and never found abundantly, each species has been interesting to search for. These notes are offered with the hope that collectors will indicate other favorable collecting localities in New England with special reference to *henrici*.

Polios has not been found near Fall River. On the shores of Waquoit Bay, a part of Cape Cod, in sunny open spaces between red pine barrens there is often found the food plant—bearberry—growing in profusion. On April 23 a fresh male was taken there. May 5 the locality was again visited and both sexes were present in about equal proportions. Some two dozen specimens were captured including an aberrant form with fawn colored upper right wing. This was the fortunate prize of Dr. Learned. A third visit on May 26 yielded no *polios* although some three pleasant hours were devoted to collecting.

Nippon has been found almost every year when sought. Our localities with young white pine trees are somewhat limited in number. April 30 the first specimen was taken at Westport Point on bearberry blossoms growing among the sand dunes. At Waquoit Bay on May 5 we found several *nippon* in our search for *polios*. On May 14 at Middleboro a few specimens were captured. Somewhat rubbed specimens were encountered on the 18th at Berkley. Again on May 27 we caught fresh female specimens on the shores of Waquoit Bay.

Augustus: In former seasons this has been the first species of *Incisalia* to appear. During 1933 the first specimen was taken on May 5 at Waquoit Bay. They were numerous and flying in company with *nippon* and *polios*. On May 9 many specimens were found on a sunny path near the water tower in Fall River. Several were taken at Middleboro on the 14th of the month. The species was still flying at Waquoit Bay on May 26. A female was detected ovipositing on a low bush blueberry blossom.

Irus has been found in scattered localities but never in abundance. In this district lupine appears to be a more favored food plant than wild indigo. Such clumps of wild lupine as are known unfortunately grow in windy, exposed areas which may account for the scarcity of the insect. May 9 the first *irus* was taken in company with *augustus* and *horatius* on the water tower path in Fall

River. Another was found on the 14th at the same place. Some two hours later I was fortunate in obtaining four richly colored specimens on a grassy path in Middleboro.

Dr. Scudder mentions obtaining specimens from Mr. Hambly, who collected in Middleboro almost a half century ago. Conceivably this area may be Mr. Hambly's collecting grounds since extended search in other parts of the town has yielded little. May 19 two more fresh specimens were taken at the same place. On May 26 at Waquoit Bay the lupine blossoms were in profusion. Almost a dozen specimens of *irus* were taken in company with *hianna* and *bathyllus*. This is by far the greatest number of *irus* we have as yet encountered at one time.

Henrici is the most sought after species of our spring expeditions. Until a few seasons ago it was not recognized from *irus*. Not over five specimens have been taken in the last decade by this writer. Wild plum, possibly the more favored food plant, is not common, but low and swamp blueberry are found in many localities. In the previous season one female specimen was taken May 10 at Berkley. This season a male specimen was taken May 17 on an oak leaf along the water tower path in Fall River. This species should be found more abundantly if a favorable collecting ground is located in southern Massachusetts.

A Tingid New to the United States.—While collecting at Oracle, Arizona (alt. 4,000 ft.), on October 14, 1934, I secured 6 specimens of a small, narrow Tingid, unknown to me at the time, from an unidentified food plant. These turned out to be *Atheas nigricornis*, described by Champion in *Biologia Centrali Americana* (Heteroptera, II: 45, pl. III, fig. 21) from Orizaba, Mexico, and from numerous localities in Guatemala. Orizaba is about 19° N., 97° W., or about 900 miles S. E. of Tucson, in the mountains, about 6,000 ft. alt.

This, so far as I can ascertain, is the northernmost record and the first from the United States, of this interesting little species.—J. R. DE LA TORRE-BUENO, Tucson, Ariz.

NEW NORTH AMERICAN TACHINIDAE

BY H. J. REINHARD, College Station, Texas.

Seven new species of diptera belonging to four different tachnid genera are described in the present paper. Type or paratype specimens of all the species are in either the U. S. National Museum or my own collection.

Anetia parvula n. sp.

Male.—Front at vertex 0.22 of the head width (average of five, 0.20; 0.22; 0.21; 0.20; 0.21), not widening to middle thence gradually so downward; parafrontals blackish, with shining gray pollen; median stripe dark reddish-brown, fully twice the width of one parafrontal except at antennae; inner verticals rather small, the outer pair not developed; ocellars proclinate; frontal bristles extending to or slightly below the middle of second antennal segment, uppermost two or three bristles suberect and but little longer than the preceding ones which are directed inward; entire face including the cheeks and posterior orbits covered with subshining cinereous pollen; antennae black, extending almost to oral margin, third segment two and one-half to three times the length of second; arista thickened on about the proximal fourth, darker and very slender beyond, penultimate segment short; parafacial bare, on narrowest part barely exceeding one-half the width of third antennal segment; face moderately receding, its ridges bearing a few bristly hairs next to the vibrissae, which are situated about on level with the mouth; cheek reddish in ground color, sparsely clothed with black hairs below the middle, about one-sixth the eye height; proboscis short and fleshy; palpi black; eyes bare; back of head gray pollinose and clothed with short pale hairs which extend about to the upper fourth.

Thorax black, gray pollinose; mesonotum subshining behind the suture with denser pollen in front which is interrupted by four black stripes, the outer pair expanded to roundish spots stopping shortly in front of suture; scutellum black and subshining. Chaetotaxy: Humeral 2; posthumeral 1; notopleural 2; presutural 2 (inner one small or hairlike); acrostichal 3, 3; dorsocentral 2, 3; intraalar 3; supraalar 3; postalar 2; sternopleural 1, 1; pteropleural 1 (small); scutellum with three lateral bristles, no apicals, the subdiscal pair hardly differentiated from the hairs on the disk; postscutellum lightly dusted with gray pollen, membranous above; calypters semi-transparent, white, the margins with a faint tawny tinge; infrascutal hairs absent.

Abdomen rather slender, shining black; segments two and three with silvery bands on basal third, the pollen on the fourth very thin and inconspicuous; basal segments each with a pair of median marginals besides a pair of discal bristles on the second; third segment bearing one pair of discals and a marginal row of eight or ten; fourth with a discal and a marginal row; genital segments small, reddish-black; inner forceps slender, divided beyond the middle and slightly divergent, base behind bearing numerous black hairs directed backward; outer forceps yellowish, about as long as inner ones but distinctly broader in profile; fifth sternite black, broadly and deeply cleft.

Legs slender, black; front pulvilli moderately elongated and almost equal the length of last tarsal segment, the others distinctly shorter; middle tibia with one bristle on the outer front side; hind tibia with several irregular bristles on the outer posterior edge, the median one largest, with one of about equal size situated on the inner hind side.

Wings a little elongate, with a uniform brown tinge the hind border slightly paler; fourth vein with a broadly rounded bend curving outward shortly before the apex and joining costa near the exact wing tip; first posterior cell narrowly open; third vein with two or three small hairs at base; last section of fifth vein short; hind cross vein almost perpendicular to fourth which it joins about midway between small cross vein and bend; epaulets black; costal spine small.

Female.—Front at extreme vertex 0.244 of the head width (average of five, 0.23; 0.25; 0.23; 0.25; 0.26); two proclinate orbital bristles present; outer verticals not developed; wings somewhat shorter and broader and the abdomen more robust than in male; genitalia with a retracted short chitinated piercer; all the claws and pulvilli small.

Length, 3.5 to 5 mm.

Described from 10 males and 43 females in my collection from College Station, Texas, April to October, 1919–1930 (H. J. Reinhard).

Holotype, male, deposited in the U. S. National Museum.

The species is less robust in build than *Anetia dimmocki* Aldrich, to which it is related. It is further distinguished by having only two sternopleural bristles, distinctly infuscated wings, etc.

***Anetia flavipalpis* n. sp.**

Female very closely resembles *A. parvula*, from which it differs in the following characters: Front at the vertex 0.264 of the head width in the one specimen, the sides densely gray pollinose and about equal the width of the middle stripe; outer

verticals almost half as large as the inner pair; parafacial on narrowest part as wide as third antennal segment; cheek about one-fourth the eye height; palpi yellow. Thoracic chaetotaxy as in *parvula* but with three sternopleurals and only two presutural acrostichals; mesonotum and scutellum uniformly gray pollinose. Abdomen with rather changeable gray pollen which on segments two and three extends thinly to the middle at the sides; denser on the basal half of the fourth segment above; genitalia with a moderately large curved piercing organ which is broadly grooved on the hind side.

Length, 5 mm.

Male.—Unknown.

Described from one female specimen in my collection, College Station, Texas, April 27, 1930 (H. J. Reinhard).

The wider parafacials, yellow palpi, and three sternopleurals readily distinguish the species from *parvula*.

***Dexodes insignis* n. sp.**

Male.—Front rather broad, at vertex 0.267 of the head width (average of four, 0.25; 0.28; 0.26; 0.28), widening but slightly below; parafrontals sparsely haired, with dense gray pollen which is sometimes faintly tinged with yellow; median stripe reddish-brown, a little wider than one parafrontal on most of its length; verticals one pair (inner) developed; orbitals absent; ocellars small, proclinate; frontal bristles extending to base of third antennal segment, uppermost two or three bristles rather stout and reclinate, the preceding ones directed inward; entire face gray pollinose, the sides bare, narrowed downward; facial ridges with several bristly hairs above the vibrissae, the latter situated about on level with the mouth; antennae black, nearly as long as face, third segment nearly four times the length of second; arista thickened on proximal fourth and very slender beyond, basal segments short; cheek reddish in ground color, gray pollinose, sparsely haired on lower part, about one-seventh the eye height; proboscis short, labella large and fleshy; palpi yellow, somewhat thickened apically and beset with numerous black hairs; eyes bare; back of head gray pollinose and moderately clothed with pale or whitish hairs.

Thorax black, gray pollinose; mesonotum marked with four black vittae, the outer pair broader and interrupted at the suture; scutellum black, dusted with gray pollen. Chaetotaxy: Acrostichal 3, 3; dorsocentral 3, 3; intraalar 3; supraalar 3; postalar 2; presutural 2; notopleural 2; posthumeral 3; humeral 3; pteropleural 1 (small); sternopleural 2, 1; scutellum with three laterals (the hindmost pair large, divergent), apical

bristles absent, disk bearing numerous short erect hairs besides a well-developed pair of preapical bristles; postscutellum normally developed; infrascapular hairs absent; calypters semi-transparent, white, the rims tinged with yellow.

Abdomen rather slender, shining black, the basal half of last three segments with changeable gray pollen which extends on the venter; first segment with a well-developed pair of median marginal bristles; second with a discal and a marginal pair, the latter slightly longer; third with a discal pair and a row of 10 or 12 stronger marginals; fourth bearing a discal and a marginal row and numerous erect bristly hairs on apical half above.

Legs black, all claws and pulvilli small; middle tibia with one stout bristle on outer front side; hind tibia with a row of uneven bristles on outer posterior side one near middle longer and moderately stout.

Wings hyaline, rather short and broad; fourth vein with a wide rounded bend ending about half the length of hind cross vein before the wing tip; first posterior cell narrowly open; veins bare except third which bears two to four setules near the base; hind cross vein oblique to fourth which it joins nearer bend than small cross vein; last section of fifth vein about one-third the length of the preceding section; costal spine small.

Female.—Front at vertex 0.291 of the head width in the one specimen and hardly wider at base of antennae; two proclinate pairs of orbitals present; outer verticals poorly developed; ocellars also small; third antennal segment about two and one-half times the length of second; abdomen broader than in male the apex pointed; genitalia without a piercing organ.

Length, 5.5 to 7 mm.

Described from four males and one female in my collection, College Station, Texas, June to October, 1919–1928 (H. J. Reinhard).

Holotype, male, deposited in the U. S. National Museum.

Traces to *D. epilachnae* Aldrich in Curran's key (Can. Ent., LIX, p. 20), from which it differs in having the claws and pulvilli short in both sexes, front broader, and the wings not extending beyond the tip of the abdomen. There are other minor differences.

***Dexodes conica* n. sp.**

Male.—Front at vertex 0.215 of the head width in the single specimen, widening rather rapidly on anterior part; parafrontals with shining gray pollen becoming thinner near vertex; median stripe reddish-brown, wider than one parafrontal except at base of antennae; inner verticals erect, of moderate

length, the outer pair barely half as large; ocellars proclinate; orbitals absent; frontals about 13 in the row, descending to apex of second antennal segment, uppermost three bristles stouter and suberect, the preceding ones directed inward; parafacial bare, with shining gray pollen hardly silvery; face moderately excavated, somewhat receding, gray pollinose, its ridges bearing bristly hairs on the lower fourth or less; vibrissae situated on level with front edge of the mouth; antennae black, slightly shorter than face, third segment wider than parafacial on narrowest part and less than twice the length of second segment; arista slender beyond the thickened proximal fourth, microscopically pubescent, basal segments short; eyes bare; proboscis short and thick, labella large; palpi yellow infuscated near base, hardly thickened apically and bearing numerous black hairs; cheek gray pollinose, bearing a few black hairs below, about one-fifth the eye height; back of head gray pollinose and clothed with rather sparse pale hairs.

Thorax black, lightly dusted with gray pollen; mesonotum subshining the dark stripes poorly defined before the suture and less apparent behind; scutellum black, with very thin gray pollen which appears denser in an extreme flat rear view. Chaetotaxy: Acrostichal 2 or 3, 3; dorsocentral 2, 3; humeral 3; posthumeral 2 (anterior one small); notopleural 2; presutural 1 (inner one not developed); intraalar 3; supraalar 3; postalar 2; pteropleural 1 (small); sternopleural 2, 1; scutellum with three lateral bristles the hindmost large, divaricate, without any smaller bristles between them, disk bearing numerous erect fine hairs; sides of postnotum beneath calypters with a single minute hair on one side none on other; postscutellum ordinary, gray pollinose; calypters opaque, white the margins yellow.

Abdomen rather narrow and conical, black, the last three segments entirely covered with dull thin gray pollen, hairs on the upper surface of each very sparse, short and erect; first segment with two pairs of median marginals, the inner ones larger; second with a pair of discals before the middle, behind these a smaller and more widely spaced pair, besides a marginal row of 10 or 12; third segment with a discal and a marginal row of long stout bristles; fourth with three or four irregular rows on apical half.

Legs rather long, black; middle tibia with two bristles near middle on outer front side; hind tibia with an uneven row of bristles on outer posterior edge, one near middle long and moderately stout; all claws and pulvilli enlarged and about as long as the last tarsal segment.

Wings somewhat elongate, hyaline with a yellow tinge along the costa and at base; third vein with three setules at base;

fourth with a rounded oblique bend, reaching margin about half the length of hind cross vein before the exact wing tip; first posterior cell open; last section of fifth vein short; hind cross vein oblique, joining fourth somewhat nearer bend than small cross vein; epaulets black; costal spine small.

Length, 8.5 mm.

Female.—Unknown.

Described from one male specimen, Madison, Wisconsin, June 12, 1930, without collector's label.

Resembles *D. epilachnae* Aldrich, from which it is readily separated by the presence of two anterodorsal bristles on the middle tibiae; wholly gray pollinose abdomen, with a complete row of discal bristles on third segment, and the third antennal segment hardly twice the length of second.

Erycia flavitarsa n. sp.

Male.—Front 0.294 of the head width (one specimen), widening moderately before the middle and rather prominent below; parafrontals gray pollinose with a light yellow tinge, clothed with fine black hairs; median stripe dark reddish-brown, narrower than one parafrontal on entire length; inner verticals strong, the outer ones hardly distinguishable from the adjacent hairs; ocellars large, proclinate; orbitals absent; frontal bristles extending to level with insertion of arista, directed inward except the two uppermost bristles which are reclinate and stouter; entire face including the cheeks gray pollinose; parafacial bare, on lower part somewhat narrower than third antennal segment; face moderately receding, the ridges divergent downward, bearing a few bristly hairs on lower extremity; vibrissae a trifle above the front edge of the mouth; antennae about three-fourths the length of face, basal segments obscurely reddish, third entirely black and four to five times the length of second; arista black, microscopically pubescent, thickened on about the proximal third, basal segments short; eyes practically bare; cheek clothed with longish black hairs, fully one-fourth the eye height; proboscis short, thick and fleshy, labella large; palpi yellow, beset with numerous black hairs; back of head gray pollinose and thickly clothed with pale hairs.

Thorax black, gray pollinose; mesonotum marked with four dark stripes which are not very well defined; scutellum red on apical half, gray pollinose. Chaetotaxy: Acrostichal 3, 3; dorsocentral 3, 4; intraalar 3; supraalar 3; postalar 2; humeral 4; posthumeral 3; presutural 2; notopleural 2; pteropleural 1 (small); sternopleural 2, 1; scutellum with three lateral, a well-developed decussate apical and a discal pair,

disk covered with fine hairs intermixed with suberect stronger bristles on apical half; infrascutal hairs absent; postscutellum normally developed; calypters opaque, white, the rims tinged with yellow.

Abdomen black, last three segments largely gray pollinose with the narrow hind margins at most subshining in certain lights, hairs along the median line somewhat longer and erect; basal segments each with a pair of median marginals, the second segment also with a stout discal pair; third bearing four or five irregular spaced discals and a row of about 14 stronger marginals; fourth with numerous bristles on the apical two-thirds above; inner genital forceps black, rather long and divided, unusually thick and slightly bowed in profile view with the apex obliquely subtruncate, clothed with fine brown and black hairs on inner and hind surface; outer forceps reddish, rather strongly bowed forward, a trifle longer and distinctly narrower than inner ones, tips evenly rounded or blunt, outer surface punctured or rough bearing some minute black hairs on basal half; fifth sternite black, narrowly and deeply cleft.

Legs black, tarsi yellow; middle tibiae with two bristles on outer front side; hind tibia bearing one or two stouter bristles in the row on the outer hind side; all claws and pulvilli enlarged.

Wings hyaline; fourth vein with a rectangular stumpless bend, thence oblique to costa narrowing the first posterior cell which is open well before the wing tip; third vein with three or four hairs at base; hind cross vein oblique, reaching fourth much nearer bend than small cross vein; costal spine vestigial.

Female.—Front 0.351 and 0.338 of the head width in two specimens, pale yellow pollinose; two proclinate orbitals; outer verticals rather stout but shorter than inner pair; proximal antennal segments including base of third red, the latter segment hardly four times the length of second; abdomen broader than in male, the hairs on upper surface depressed, hind margins of intermediate segments shining black; genitalia retracted, but evidently not adapted for piercing; all claws and pulvilli short.

Length, 9 to 10.5 mm.

Described from three specimens as follows: one male and one female, Monrovia Canyon, California, July 6 and 12, 1930 (C. H. and D. Martin); one female (holotype), Whittier, California, July 14, 1930 (D. Martin). The holotype is returned to Chas. H. Martin.

Similar to *Erycia celer* Coquillett, but at once distinguished by the yellow tarsi in both sexes, and the longer genital forceps in the male.

Erycia levata n. sp.

Smaller than *E. flavitarsa*, which it closely resembles except as follows: Front in male 0.232 of the head width (five specimens measured), prominent below in profile; face strongly receding, the sides on narrowest part about one-half the width of third antennal segment which is hardly four times longer than the second. Thoracic chaetotaxy as in *flavitarsa*; mesonotum behind the suture and scutellum thinly dusted with gray pollen and subshining in most angles. Abdomen shining black on the broad apices of last three segments above, the intermediate ones with rather thin reflecting gray pollen on the basal margins, fourth with thicker pollen which extends beyond the middle at the sides; genital forceps about as in *flavitarsa*, but the inner ones distinctly narrower and almost straight behind in lateral view, the apex rounded or blunt; the outer pair bowed forward on apical third with the hind margin evenly arcuate to the pointed tip. Legs entirely black.

Length, 7.5 mm.

Female.—Unknown.

Described from five specimens as follows: one, Hood River, Oregon, June 8, 1917 (F. R. Cole); one Olympia, Washington, July 27, 1933 (C. H. Martin); two, Yelm, Washington, June 9, 1933 (J. Wilcox); and one (holotype) from California without precise locality, May 19, 1927, no collector's label.

Phorocera omissa n. sp.

Belongs to the subgenus *Parasetigena*. In Aldrich and Weber's key (Proc. U. S. N. M., vol. 63, p. 51), traces to *tachinomoides* from which it differs most essentially in lacking the tuft of dense hairs before the middle coxae; the inner forceps of the genitalia are shorter, less strongly carinate behind and thinner in profile; the antennae are longer approximating the height of face. Additional differences are mentioned in the following description:

Male.—Front at narrowest part (before triangle) 0.306 of the head width (average of five, 0.33; 0.30; 0.30; 0.31; 0.29), moderately prominent below; parafrontals with gray pollen which is usually tinged with yellow especially on the upper part; frontal stripe dark brown, at middle about equal the parafrontal width; verticals one pair (inner) developed, reclinate; ocellars strong, proclinate; frontals seven to ten in number, the two uppermost strong and reclinate those below smaller and directed inward, the row descending slightly below the insertion of arista; face gray pollinose, moderately excavated, its ridges with a row of stout bristles extending above

level of the lowermost frontal; parafacial with dense subshining gray pollen, bare, on narrowest part below about as wide as third antennal segment; cheek black-haired and gray pollinose, about one-seventh the eye height; antennae black the second segment reddish and about one-sixth the length of third; arista reddish-black, thickened on basal two-fifths, penultimate segment only slightly longer than wide; proboscis short, labella fleshy; palpi yellow, bearing black hairs on apical half; eyes hairy; back of head gray pollinose, thickly clothed with pale gray or whitish hairs.

Thorax gray pollinose, with four rather narrow dark dorsal stripes which are usually distinct, the outer ones interrupted at suture and extend almost to base of scutellum; the latter reddish on apex, gray pollinose. Chaetotaxy: Acrostichal 3, 3; dorsocentral 3, 4; humeral 4; posthumeral 2 or 3; notopleural 2; intraalar 3; supraalar 3; postalar 2; pteropleural 1; sternopleural 2, 1; scutellum with 3 lateral besides a small decussate upturned apical pair, disk covered with coarse erect hairs; postscutellum dusted with gray pollen; calypters opaque, white.

Abdomen black the sides faintly reddish, with gray pollen which extends beyond the middle of the intermediate segments above, rather sharply limited on sides of third but continuing on venter along base of second; fourth segment with dense pollen which is also sharply limited at the sides, the apical half or more shining black; a dark median vitta usually apparent; segments one and two with a pair of median marginal bristles (smaller on first); third with a marginal row of about ten; fourth bearing a discal and a marginal row besides numerous weaker bristles along the sides; genital segments blackish; the united inner forceps rather slender, tapering to an acute apex, behind carinate to middle or slightly beyond and thickly clothed with rather short brownish pile except at extreme apex; outer forceps very thin and tapering, red, the apex darker beset with numerous black hairs; fifth sternite broadly and deeply cleft, the lobes dark, bearing a few slender black hairs.

Legs black; middle tibia with two stout and two smaller bristles on the outer front side; hind tibia outwardly ciliate with several longer bristles; claws and pulvilli about of equal size and exceeding the apical tarsal segment in length.

Wings hyaline; bend of fourth vein almost rectangular with a long fold; first posterior cell open far before tip of wing; third vein with about five hairs at base; last section of fifth vein approximating half the length of the preceding section; costal spine small.

Female.—Very similar to *claripennis*. Front at vertex 0.368

of the head width (average of five, 0.37; 0.36; 0.38; 0.37; 0.36); third antennal segment black, about three times the length of second which is wholly red; two pairs of proclinate orbitals present; outer vertical bristles about one-half as long as the inner ones; last three abdominal with the shining black hind margins narrower than in male, the pollen on last two segments extending on the venter; claws and pulvilli short.

Length, 6 to 10.5 mm.

Described from 51 specimens. In my collection 39 males and 9 females from College Station, Texas, April to November, 1917-1933, and 1 male, Prairie View, Texas, June 18, 1933, (H. J. Reinhard). In the University of Arkansas collection 1 male, Washington County, Arkansas, reared from *Eurymus eurytheme* Boisduval, June 12, 1932, by Dwight Isely. In D. G. Hall's collection 1 male from Charleston, South Carolina, October 19, 1930 (D. G. Hall).

Holotype, male, from College Station, Texas, in the U. S. National Museum.

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AN UNDESCRIBED ACALYPTA FROM NEW YORK
(TINGITIDAE: HEMIPTERA).

BY CARL J. DRAKE, Ames, Iowa.

***Acalypta barberi* sp. nov.**

Moderately large, ovate, dark brown. Head blackish, with two short, blunt, porrect, frontal spines. Bucculae open in front. Rostrum reaching near the end of channel. Antennae moderately slender, dark brown, the terminal segment blackish; segment I much stouter and longer than II; III very long, slender, about two and one-half times the length of IV; IV fusiform, black, hairy.

Pronotum very coarsely pitted, reticulate-like in appearance, tricarinate; median carina more strongly elevated, composed of one row of long, rectangular areolae; lateral carinae strongly divaricating posteriorly, uniseriate; triangular projection rounded at apex. Paranota rectangular in form, biseriate, slightly reflexed, the lateral margin slightly convex. Hood rather small, slightly higher than median carina, inflated, projecting subangulately over basal portion of head. Elytra rounded behind; costal area uniseriate, the areolae moderately large; subcostal area very broad, composed of five, irregular and confused rows of areolae; discoidal area elevated, large, bounded by a prominent, costate nervure, the outer margin sinuate and more elevated. Body beneath dark brown. Legs dark, moderately stout.

Length, 2.10 mm.; width, 1.46 mm.

Holotype, female, brachypterous, Merrifield, New York, July 21, 1927, collected by C. R. Crosby, U. S. National Museum. The divaricating lateral carinae separate this species at once from *A. lillianis* Bueno, also from the members of the genus having the paranota rectangular-like in outline. The macropterous form is unknown.

Random Notes from a Home Garden.—A surprising variety of insects find their way into the narrow confines of my home garden adjacent to woodlands. The season of 1934, following a winter of unusual severity, on the whole proved less prolific than those of preceding years. Aphids were so few as to permit the omission of spraying; and the Canker Worm, *Alsophila pometaria*, so very destructive to orchard and fruit trees in 1933, had perceptibly decreased. Together with this decrease, there was noted

a decided increase in the number of predaceous ground beetles of the genus *Calosoma*, particularly the species *calidum*, *scrutator* and *willcoxi*, of which dozens could be seen on tree trunks during June, preying on the canker worms. *Willcoxi*, ordinarily the more numerous of the three species mentioned, occurred in the proportion of three to one of the others. A similar observation was made 25 years or more ago at Wading River, Long Island, following an outbreak of the canker worm. The European introduction, *Carabus nemoralis*, now so generally distributed throughout Westchester County, apparently did not share in the pursuit of such easy prey.

The Asiatic Beetle, *Anomala orientalis*, has proved increasingly troublesome, as evidenced by the appearance of so many unsightly, wilted lawns. On warm summer evenings the adult beetles cause a continuous thumping, flying against window screens. The underground larvae are sought for assiduously by starlings and flickers, which on occasion have left my hillside punctured with holes like a sieve. So far, we have escaped a serious invasion of the Japanese beetle, *Popillia japonica*, the first specimen having been collected in my garden on a Dahlia blossom on September 2d.

The praying mantis, *Paratenodera sinensis*, has wintered poorly in Westchester County in 1934. Several egg masses, laid naturally on shrubs around the house, failed to produce any young. So far, only one adult female has been seen in early September.

Of greater interest I regard the capture on August 9th of two specimens of the bombylid fly *Anthrax simpson*, one freshly emerged from the hole of the carpenter bee, *Xylocopa virginica*, in a cedar post trellis and the other resting on the wall of the house near-by. Two pupal skins protruding from the tunnel of the carpenter bees showed by their moisture that emergence had been quite recent. A piece of cheese cloth was bound loosely over the aperture, but no further emergences occurred. While it is well-known that all the Bombylidae develop as parasites on other insects comparatively few life-histories have been worked out. J. R. Malloch (Bull. Ill. Nat. Hist. Surv., vol. 12, p. 393) gives a detailed description of the pupae of *Anthrax simpson*, based on material obtained by W. L. McAtee from the nest of *Xylocopa virginica* at Plummer's Island, Md., on July 31, 1910. In arid regions of the West species of Xylocopinae frequent the dead stalks of *Yuccae* and *Agave*. On several occasions, I have found their nests inhabited by larvae of *Anthrax*, but failed to get adults.—GEO. P. ENGELHARDT, Hartsdale, N. Y., Sept. 8, 1934.

A NEW SPECIES OF MALLOCERA FROM THE BRITISH WEST INDIES.

BY E. GORTON LINSLEY, Oakland, Calif.

The genus *Mallocera* Serv. is typically Neotropical with seven species known from Brazil and one from Central America. The following is the first recorded species from the West Indies:

***Mallocera aureotincta* Linsley, n. sp.**

Elongate, somewhat flattened, clothed with a fine, golden, silky pubescence. Head broad, moderately densely clothed with a short, recumbent pubescence; finely, densely punctured, with a few larger variolate punctures intermixed; eyes coarsely granulated, convex; antennae one-half longer than the body in the male, only slightly longer in the female, finely punctured, clothed with a short appressed golden pubescence, with longer flying hairs on inner side; segments three to six in the male and three to eight in the female, carinate, spinose at apex; scape short, stout, two and one-fourth times as long as broad, second segment small, broader than long, third segment a little more than three times as long as scape, remaining segments shorter and more slender, segments five to eleven diminishing gradually in length toward apex. Prothorax transverse, slightly constricted at base and apex, obliquely impressed at sides of disk above the subacute lateral tubercle; pubescence fine, appressed, darker than on head; punctuation fine, dense, with scattered larger punctures. Elytra elongate, not quite three times as long as broad; pubescence fine, reddish-brown, with five patches of golden pubescence at sides, one humeral, one subbasal, one median, one post-median, and one subapical, of which only the last two attain the suture, and a narrow sutural vitta extending from median area nearly to scutellum; pubescence intermixed with short, black, stiff, suberect hairs which spring from rather coarse, visible punctures; apices obliquely truncate with the outer angle spinose. Legs long, slender; femora slightly clavate, posterior pair extending beyond the apex of the elytra in the male, not quite attaining the apex in the female; pubescence fine, mixed with long coarse, suberect hairs. Body beneath finely punctured, clothed with short, reddish-brown and golden pubescence and with dense, long, soft, flying hairs on the underside of head and thorax, sparser, shorter, and less dense on abdomen. Pygidium broadly rounded in the male, narrowly rounded in the female. Length 20 mm.; breadth 4.5 mm.

Holotype, male, Trinidad, British West Indies, February 2,

1931, and allotype, female, Trinidad, March 4, 1930, very kindly sent to me for study by Mr. Lionel Lacey.

This species agrees with *M. amazonica* Bates, *M. umbrosa* Goun., and *M. spinicollis* Bates in the unispinose apices of the elytra, but may be distinguished from all of these by the body color and elytral pattern. From *M. amazonica* it further differs in having the punctuation of the elytra clearly visible, the prothorax less elongate, and the lateral thoracic spine subacute. The dense beard of long flying hairs on the underside of the head and thorax will separate it from *M. umbrosa*, and the absence of a polished, black, longitudinal carina on the prothorax will distinguish it from *M. spinicollis*.

Description of coloration in members of this genus is rather difficult because of the changes brought about by different lights. In general, *M. aurcotincta* is reddish-brown, with the head, thorax, and elytral fasciae golden. In some lights, however, the elytral fasciae appear faintly silvery, particularly when compared with the type species of the genus, *M. glauca* Serv.

A NOTE ON MIGRATING MILLEPEDS (*PARAJULUS VENUSTUS*).

BY PHIL RAU, Kirkwood, Missouri.

On November 4, 1933, I received a telephone call stating that for the past three or four days many hundreds of wormlike creatures had been coming in through the basement windows and on the first floor of the home of Mrs. Walter Wolf in Osage Hills. This home is in the suburbs west of St. Louis and is on the wooded hills overlooking the Meramec River Valley. I asked for specimens, and the half dozen that came were sent to Dr. R. V. Chamberlin, who identified the milleped as *Parajulus venustus* Wood. With the specimens came the following note from Miss Margaret Wolf:

"We became aware of a worm or snakelike creature of brown tint coming through basement windows and accumulating there, and also spreading to the first floor. Having no idea that this might be unusual, we killed many of them. In fact they got to be a nuisance, for they were wherever you stepped. When someone came near them, they would coil into a tight ball not at all unlike a snake, and indeed their movements were quite snakelike. They were thin and

ranged in size from three-fourths inch to one and one-half inches. I do not know what they lived on unless it was the firewood from old trees in the basement. Almost at once after a few days, they disappeared and nothing has been seen of them since. We also saw them on the street nearby, but now they too are gone."

These details would hardly be worth recording except that records show that migrating armies of a milleped of another species, *Fontaria brunnea*, were frequently seen in the central part of Virginia by Mr. Fred E. Brooks (A Migrating Army of Millepedes, Journ. Econ. Entom. 12: 462-464. 1919) during a period of fifteen years.

Miss Wolf's account does not seem exaggerated when one reads in Brook's account that during this period he has on several occasions seen armies of *Fontaria brunnea* migrating over the ground in woods and fields moving in either scattered or densely formed companies, sometimes only two or three individuals to the square foot and at other times averaging a hundred or more to the square foot.

The same writer also records the remarkable occurrence of another species *Fontaria virginensis*, which was observed for four weeks moving in a southerly direction over two farms near Littleton, Virginia; more than seventy-five acres had been covered with millepedes; even a small barn had been covered to the tip of the roof with them and it was estimated that the army was composed of not fewer than 63,340,000 millepedes.

It is interesting to note the difference in dates when the migrations occurred, *F. virginensis* taking place in the middle of July in Virginia and here at Kirkwood, *Parajulus venustus* becoming active in early November.

With renewed interest in problems of migration, due to the recent book by C. B. Williams, "Migration of Butterflies," I would urge naturalists to be on the lookout for additional evidence on the migration of millepedes with a view to studying the behavior and the ecology of the creatures. This much at least may be said for migrating millepedes; they do not fly swiftly out of reach of the observer as do the butterflies. With a little patience these creatures may be followed to their destination or their doom, and with intelligent forethought one can inaugurate experiments that may give a clew to a solution of the problems of migration.

SOME NEW EUCHARIDID PARASITES OF AUSTRALIAN ANTS.

BY CHARLES T. BRUES, Cambridge, Mass.

The material dealt with in the present paper was collected in Australia by Professor W. M. Wheeler during his sojourn there as leader of the Harvard Australian Expedition in 1931-32. The very rich ant fauna of Australia undoubtedly supports a large number of species of the chalcidoid family Eucharididae, as all the known forms are parasites of ants. So far, such a meagre series has been described from this region that it is not surprising to find all which were obtained by the Expedition to be undescribed.

Three genera, *Tricoryna*, *Schizaspidia* and *Eucharomorpha* are represented, each by a single species and these are described below. Several of the ant colonies in which the material was collected were heavily parasitized, containing numerous pupae in addition to adults.

Eucharomorpha Girault.

Trans. Proc. R. Soc. Australia, vol. 37, p. 94 (1913).

Girault, Arch. Naturg. Abt. A, Heft. 6, p. 62 (1913).

Gahan and Fagan, Bull. U. S. Nat. Mus., No. 124 (1923).¹

Eucharomorpha wheeleri sp. nov. (fig. 1).

♀. Length 2.0-2.5 mm. Brilliant metallic blue-green, the head and parapsides strongly green, the mesonotum, mesopleura below, propodeum, base of legs and abdomen clearly blue. Antennae black, the scape and pedicel brown; legs whitish yellow on tips of femora and beyond, the coxae and most of femora metallic blue, trochanters and tips of tarsi brown. Wings slightly brownish, the veins dark brown. Sheaths of ovipositor whitish toward tips. Head very flat, three times as wide as thick; the eyes bare, very strongly protuberant, much

¹ There is some confusion concerning the type species. Girault's original description of the genus appeared in the Australian journal with *E. viridis* cited as type but some neotropical species described by him later were published in advance of his generic description. Gahan and Fagan cite one of these latter species as the genotype, stating that *E. viridis* was not originally included. This is obviously contrary to the intention of the author and is based simply on the more prompt printing of the German journal, as the characterization of "*Eucharomorpha* n. gen." is in the Australian periodical.

shorter than the malar space. Surface of head rugulose, the deep impression above the antennae more finely sculptured. Ocelli in a triangle; the posterior pair equidistant from the eye and from each other and two-thirds as far from the anterior one. Right and left mandible nearly symmetrical, each with three large teeth (Fig. 1, *a*). Antennae 11-jointed, not count-

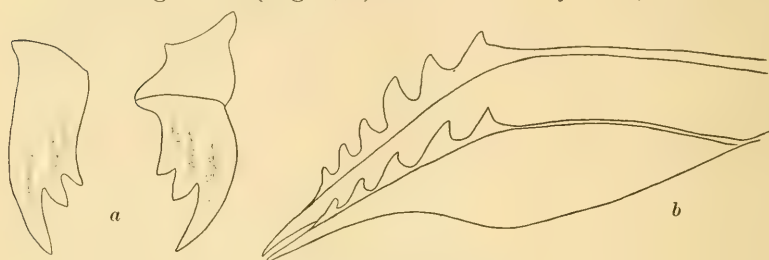


FIG. 1.—*Eucharomorpha wheeleri* sp. nov.

ing a ring-joint nor a very indistinct division of the club-joint; scape three times as long as wide, almost as long as the first three flagellar joints together; flagellar joints all very nearly equal in length, the first considerably more slender; club-joint nearly as long as the two preceding joints; pedicel oval, equal to the first flagellar joint. Mesonotum finely rugose, flat or slightly concave in front; notauli very deep, their sides strongly sloped so that the bottom forms a finely punctate line. Parapsides and axillae together forming a convex almost tuberculate, smooth and polished elevation. Scutellum strongly convex; with a smooth transverse furrow, behind which it is rugulose; anteriorly more or less longitudinally striate, with a small rounded polished space before the groove. Propodeum rugose, with a distinct median carina. Pleurae and coxae rugulose. Abdominal petiole very short, the abdomen practically sessile, rather broad; shining, but very shallowly roughened or reticulate on the surface. Ovipositor sheaths very stout, curved downwards, not attaining the tip of the abdomen; ovipositor (Fig. 1, *b*, seen in a specimen treated with caustic potash) broad, curled upwards on each side which bears a series of about six saw-like, slightly recurved teeth that become very minute before the tip which is prolonged as a slender dart on each side in line with the row of teeth. Wings with the radial vein almost as long as the marginal, postmarginal one-third as long; stigmal very short, tuberculate.

Type and numerous paratypes, all females, most of which had not yet emerged from the pupal envelope.

This species was taken with *Pheidole proxima* Mayr at Wentworth Falls (altitude 2800 ft.), New South Wales. The material came from two nests, collected on successive days, December 22 and 23, 1931, by Professor Wheeler.

This species is very similar to *E. tridentata* Girault from Queensland, but differs in several characters, so after a careful comparison with the original description there seems to be no doubt that the present form is new. The antennae have the second funicular joint fully as long as the first which is not longer than the pedicel. The color of the head and thorax is bright green, not purple and the scutellum is distinctly striated in front of the transverse groove, especially on the sides.

Tricoryna Kirby.

Journ. Linn. Soc., Zool., vol. 20, p. 29 (1886).

***Tricoryna chalcoponeræ* sp. nov. (Fig. 2).**

♀. Length 3.4–3.6 mm. Head and thorax black, with a slight, but distinct dark greenish-blue sheen, abdomen dark brown; antennae brown, somewhat lighter apically and with the scape and pedicel yellowish; legs brown, the front tibiae pale yellowish; tarsi pale beyond the first joint. Wings hyaline. Head very coarsely rugose, its sculpture becoming more or less transversely strigose on the sides of the face below; clypeus polished, with large deep foveae above; a small,

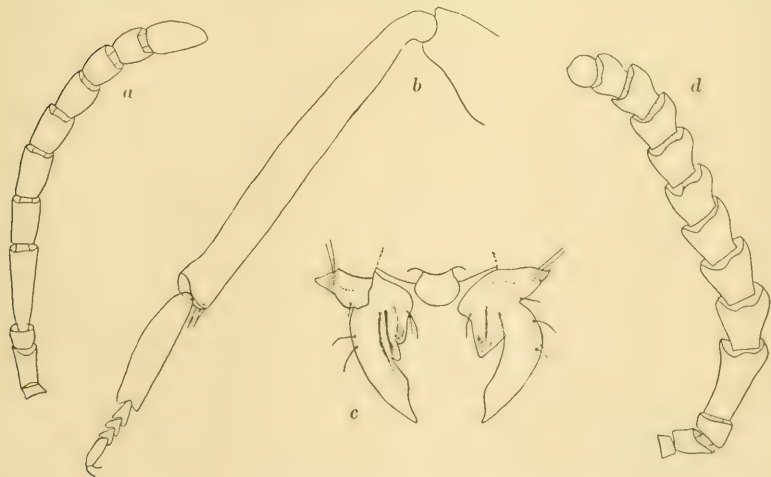


FIG. 2.—*Tricoryna chalcoponeræ* sp. nov.

rounded area just below the base of the antennae also polished. Head seen from above nearly four times as wide as thick; ocelli forming a curved line, the posterior ones equidistant from the eye margin and from each other. Eyes sparsely clothed with stiff hairs; somewhat shorter than the malar space which is coarsely vertically striate. Left mandible (Fig. 2, *c*) with one large tooth within at base; right mandible with two smaller teeth at base. Antennae (Fig. 2, *a*) 10-jointed (or 12-jointed if the last indistinctly divided joint is counted as three); scape is very short, about half as long as the first flagellar joint which is three times as long as thick; pedicel shorter than wide; second flagellar joint less than twice as long as thick, two-thirds as long as the first; following slowly growing shorter, but all slightly wider than long. Mesonotum with a slight median impression in front; its surface irregularly striate, more or less transversely so in front, obliquely so on the sides behind and longitudinally so medially behind; the oblique striae crossing the notauli and extending on to the parapsides, except that the parapsides are smooth and highly convex centrally over a large area. Axillae rugose, not much shortened where they meet medially. Scutellum longitudinally rugose-striate, not much longer than wide, with a bluntly rounded apex which projects only slightly beyond the post-scutellum in profile view. Propodeum longitudinally striate behind, obliquely so on the sides; pleura rugose, the mesopleura horizontally striate behind. Abdominal petiole as long as the propodeum, about one-fourth longer than the hind coxa; smooth, with a few striae at the base. Gaster smooth and shining first tergite occupying one-third its length, second short; third and fourth equal, longer. Wings with very minute hairs; marginal vein three-fifths as long as the submarginal; post-marginal long, two-thirds as long as the marginal; stigmal vein very short, perpendicular to the costal margin.

♂. Differs from the female in having the antennae 12-jointed with the last three joints as strongly separated as the others (Fig. 2, *d*); first flagellar joint very much thickened apically, the following joints similarly widened and scarcely wider than long, fifth and following flagellar joints clearly moniliform and growing gradually smaller to tip of antenna; entire flagellum densely clothed with very minute bent or hooked hairs. First joint of hind tarsi as broad as the tibia and one-third as long (Fig. 2, *b*); abdominal petiole longer, nearly one-half longer than the hind coxa; stigmal vein present only as a triangular thickening at apex of marginal vein.

This species was taken with *Chalcoponera metallica* F. Smith, var. *cristulata* Emery at the Creel on Mt. Kosciusko, New South

4. Apical, constricted portion of scutellum as long as the basal portion, longitudinally striated; flagellum of antennae apically thickened, but not serrate *S. rudis* Westwood
 Apical portion of scutellum much shorter than the basal portion, rugose-punctate *S. calomyrmecis* sp. nov.

***Schizaspidia calomyrmecis* sp. nov.**

♀. Length 5.0 mm. Head and thorax black, with purplish or coppery bronzy reflections; gaster brown, the abdominal petiole pale yellowish; antennae piceous, lighter brown at tips; legs yellowish, the coxae black and the femora darkened at the base; wings hyaline. Head circularly striate; the striae more or less vertical on the front, except that the supra-antennal depression is transversely striate; striae of face more or less transverse, those on the median convex area much finer and the clypeus entirely smooth and polished; striae behind the eyes following the contour of the eye-margin; intra-ocellar space rugose. Antennae (Fig. 3) 12-jointed; scape short,

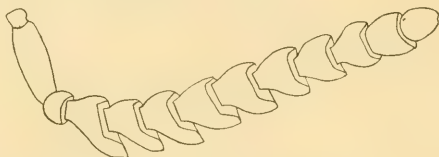


FIG. 3.—*Schizaspidia calomyrmecis* sp. nov.

about twice as long as thick, not reaching to the anterior ocellus; pedicel small, globular; first to eighth flagellar joints of about equal length, each prolonged at the apical corner, so that the apical width is greater than the length, the prolongations weaker on the seventh and eighth joints; ninth flagellar joint oval; tenth oval and much smaller. Thorax above and scutellum very coarsely and almost confluent punctate with a smoother, finely rugulose area on the disk of each of the parapsides. Notauli deep, crenate, straight, well separated behind. Base of scutellum with a crenate line; its apex bearing a forked process less than one-half the length of the scutellum, the prongs diverging, sharply rounded at tips and without tooth inwardly before apex. Pleura irregularly punctate-reticulate, the mesopleura above more or less obliquely striate. Declivity of propodeum finely, shallowly reticulate except toward the sides where it is coarsely reticulate, the lateral edge defined by a carina that terminates above in a tooth-like projection. Abdominal petiole short, as long as the hind coxa and trochanter combined. Abdomen shining although distinctly sparsely punctulate; first to fourth tergites sharply incised medially on their posterior edges.

Type and one other female specimen from Meekatharra, West Australia, September 23, 1931 (W. M. Wheeler). Both specimens were taken in a nest of *Calomyrmex purpureus* Mayr, still enclosed in the cocoon, although fully developed. After removal from the cocoon the wings were seen to be partially unexpanded and the color of the abdomen a rather light brown, very pale on the sutures, indicating I feel sure, a fuscous color in fully matured specimens. Although a number of cocoons are included in the vial, no other parasites are present, and no trace of the preparatory stages is to be found.

This species may be distinguished from the other Australian species as indicated in the key.

IMPORTANT NOTICE

The Editor has a new address—

1622 East Hawthorne Street, Tucson, Arizona.

All contributions, MSS., papers and correspondence for the BULLETIN OF THE BROOKLYN ENTOMOLOGICAL SOCIETY and ENTOMOLOGICA AMERICANA must come to the above address.

All orders for publications and all remittances must be sent to Geo. P. Engelhardt, Treasurer, at 28 Clubway, Hartsdale, N. Y.

J. R. DE LA TORRE-BUENO, *Editor*,
Brooklyn Entomological Society,
1622 East Hawthorne St., Tucson, Ariz.

Lantern Fly at Sea.—Dr. H. P. Löding, of Mobile, Ala., has sent in a sketch of an insect which proved easy to determine as the lantern fly, *Fulgora laternaria* L. The specimen was obtained from two seafaring men, who reported that it flew on board of their ship, when five miles off the coast of Nicaragua. This insect is not uncommon throughout the tropical region of Central and South America, and is often attracted to light. Its capture so far out at sea, however, is of interest.—GEO. P. ENGELHARDT, Hartsdale, N. Y.

HALLUCINATIONS OF INSECT INFESTATION CAUSING ANNOYANCE TO MAN.¹

BY ROGER C. SMITH, Manhattan, Kans.

Pierce (1921, p. 21)³ makes the only known reference in entomological literature of sensory hallucinations involving insects resulting in worry and annoyance to persons. Two cases believed to illustrate visual and tactile hallucinations of insect attack recently came to the attention of the Department of Entomology of the Kansas State College. Brief descriptions of the two cases with probable explanations are deemed worthy of record, especially for those interested in the field of medical entomology.

The first case was that of a traveling man, Mr. A, who claimed he had been annoyed by some insect which he described as "black in color, with a hard shell, quick as lightning, digging into my skin, especially on the back of my head." He wrote that "they do not stay on the clothing or on the bedding but hide in the skin and do not go on anyone else." He had been annoyed by them for three years but their activities were most noticeable between 5:00 and 11:00 p. m. each day. They burrowed in his eyes, entered his ears, nose, and mouth. He insisted that he could never catch them but finally, after an explanation of hallucination was given him, he sent five ordinary bedbugs as his tormentors, probably to disprove the explanation. This information is selected from five long, somewhat incongruous letters written by him. He had used "blue ointment, carbolic acid, camphor, coal oil, turpentine, saltwater and alcohol" among other things, but these small, very active creatures "went right through it." A 10 per cent solution of Volck was strongly recommended in the hope that he might convince himself of complete relief. He claimed it was not strong enough but a 20 per cent solution or stronger gave him relief but did not kill the creatures.

¹ Contribution No. 422 from the Department of Entomology, Kansas State College.

² The contact with the two cases described came in connection with regular office routine but not in connection with any agricultural experiment station project. The explanation and discussion of the cases were developed through consultations with Dr. O. W. Alm and Dr. J. C. Peterson, psychologists at the Kansas State College, to whom grateful acknowledgment is made for ideas, suggestions of texts and for critical analyses of this report.

³ Pierce, William Dwight. *Sanitary Entomology*. Boston. Richard G. Badger. 518 p. c 1921.

The second case, whom we shall designate as Mr. B., involved a house to house canvasser. He came to the office of the Department of Entomology, March 9, after consulting a local physician about a supposed infestation of insects in his clothing and on his body. He stated that he was annoyed by small, active creatures running over his body and boring in. He disrobed and indicated exact spots on his body where he felt them boring in at the moment. Examination with a lens showed no insects or mites present. His hair had been clipped short so he could more easily catch those troublesome creatures. In his efforts to catch them he had dug deeply into his skin with his nails, especially on his head and arms. Scabs three to five millimeters in diameter had formed over them. Otherwise his skin was clean and in good condition. He stated that a few days before, he had seen one of these creatures, which he described vaguely, on his thumb but it "escaped before I could grab it." He picked small specks from his underclothing which he said were the creatures.⁴ Microscopic examination showed them to be portions of scabs or small rolls of lint. He stated that one laundry had boiled his underclothing for eight hours in order to destroy his tormentors, but he saw the annoying creatures on the clothing as soon as it was unwrapped. He had begun bathing his body with kerosene to destroy the pests. He suspected that he obtained them in his room which he had occupied for about a month. A small bottle containing 70 per cent alcohol was given him and he was asked to bring in as many of the pests as he could catch. The next day he came in with quite a collection of scabs, lint and other objects which might be classified as household dirt particles. There were no insects nor any formerly living things in the bottle. No evidence of body lice, mites of any kind, or bedbug bites were observed. No evidence of hypodermics was visible either.

Since, so far as could be determined, there were no insects really involved, at least at the moment, in either case, some thought was given to the cases and to similar ones in an attempt to arrive at an adequate scientific explanation. The first question arising is whether the two men were normal individuals. Mr. B, whom the author met several times, looked and acted a little "queer." Mr. A

⁴ Prof. J. J. Davis of Purdue University informed the writer, by letter, of a similar case in which a Chicago woman afflicted with neurasthenia had insect illusions about very small specks on her linens, dishes, curtains, and other household articles. After a superficial fumigation of the house, she was assured there would be no further trouble, and no further complaints were made.

wrote long, incongruous letters in a style and manner which gave evidence of flight of ideas, incoherence and of mild intoxication. In both cases, the descriptions of the insects did not fit any known forms and their activities were equally unnatural. It is highly probable, therefore, that these two cases illustrated mild forms of insanity and that the supposed creatures were illusions or hallucinations.

Moss and Hunt⁵ (p. 132) define an hallucination as "a response to a situation that apparently has no external reality. It manifests itself in sensations of various things that are not actually present at the time as stimulating objects or phenomena." Hallucinations are essentially intensified memory images which have been mentally projected and thereby given external reality. Their absurdity is due to the lack of criticism of the higher mental functions. While hallucinations are more likely to be visual and auditory, they may occur in any of the other senses. A delusion on the other hand is "a false belief held in the face of manifest evidence of its absurdity." These vary from those which can scarcely be distinguished from an incorrect belief held by a normal person to very absurd ones, as believing one is President of the United States (p. 140). "Illusions are inaccurate perceptions of things actually present in the environment. They differ from hallucinations primarily in that there is an actual external stimulus present as a basis for the reaction" (p. 149).

The explanation of possible hallucinations was made to both persons described, but neither appeared to be convinced of it. This response is to be expected, since such experiences are tremendously real to the victim and he usually cannot be argued into believing that what he sees or feels is not real. The imaginary creatures compel the attention of the victim, causing him fully as much discomfort as if the real pests were present.

Hallucinations, delusions, illusions and other phenomena are characteristic of dementia praecox, paranoia, senility, and border line cases of insanity. Some psychologists take the stand that all persons suffering from such experiences are to be regarded as potentially dangerous. Individuals of the type described may not do injury to anyone, but they are a great annoyance to their friends and to those with whom they come in contact. Such cases are really frequent and they are very difficult to treat outside of institutions. Ordinarily some treatment, scientific or foolish, which the patient can be made to apply with confidence, will bring about some relief.

⁵ Moss, Fred A., and Hunt, Thelma. *Foundations of abnormal psychology*. N. Y. Prentice-Hall. 548 p. 1932.

Usually such people become community nuisances and are eventually sent to some institution, where some improve.

It is probable that the persons described were what society would classify as normal individuals, but through memory or autosuggestion were reacting to past experiences or pseudoreminiscences as they are designated. It is common knowledge that many persons can be made to feel some creature crawling upon them by the mere mention of it. Then again, certain tactile sensations may be interpreted as the activities of some creature crawling on them because of memory or similar experiences. Letters frequently are received by the Department of Entomology from persons telling of annoyance by supposedly large numbers of creatures which from descriptions might be mites, book lice, silver fish, fleas or other house pests, but when these persons are asked to send in specimens for identification, they are often unable to find any of them, or they send in something wholly different from that described. A mild type of sensory hallucination is met with in persons who, having had mites or chicken lice crawl on them, continue to feel them crawling over them long after all have been removed. This type of autosuggestion is perhaps indicated by correspondents in the fall of the year when the frost kills the vines on homes and the mites begin to scatter, entering homes and crawling on bed linen or persons. A very few mites may, through autosuggestion, cause annoyance for weeks.

The extreme fear of insects and certain other animals manifested by some people, especially women, sometimes leading to hysterics, is a companion phenomenon. Virtual paroxysms of fear resulting perhaps from seeing the most harmless of creatures amount to a definite psychosis. A lack of information about the creatures is fundamentally involved, but the reaction probably is basically in the quality of the nervous system of the individual.

A common cause of hallucinations and related phenomena of the types described is the use of certain drugs, particularly cocaine and alcohol. Some relevant statements selected from a leading text are significant.

"The illusions and hallucinations (of cocaine users) may affect all the senses, but especially vision, touch and the muscular sense. Objects change their shape and are constantly moving. A patient of Saury's felt himself assailed by a swarm of bees which he could see and feel. Patients feel worms creeping over their bodies or coming out of their flesh; they see them, seize them with their

fingers, and crush them under their feet⁶ (p. 363). . . . Hallucinations of touch are frequent in certain toxic psychoses (delirium tremens, cocaine delirium) and in chronic delusional states. . . . They feel as though spiders are crawling on their bodies" p. 35). "Toxic conditions also sometimes produce cutaneous hallucinations as seen in the patient with delirium tremens brushing off the bugs he feels crawling over him, or in the cocaine user scratching to rid himself of the 'cocaine bug' which he feels crawling about just under the skin (p. 138). In some patients, hallucinations have been observed associated with general run-down physical condition" (p. 139). "Illustrations are not characteristic of the insane alone, but nerve fatigue may produce a misinterpretation of stimulus in a normal individual (p. 149). A characteristic symptom (of cocaine usage) is formication of the hands, a sensation of worms or small bugs crawling over or just under the surface of the skin" (p. 335).

It can be seen that the hallucinations of cocainosis bear a close resemblance to the two cases described, especially the second, though no proof is at hand to indicate this was the cause. Mr. B assured the writer he was not snuffing cocaine. This response is to be expected whether or not the individual is a drug addict.

The writer has no definite recommendations to make in the disposal of such cases, except that they should not be ignored. These harassed individuals approach entomologists with a sincere desire for assistance and their cases should be treated with sincerity and understanding. It is important to obtain and keep the full confidence of the person so that recommendations made for his help will be followed explicitly. Since hallucinations and related phenomena usually have a physiological basis, the persons may be recommended to consult a physician or psychiatrist in whom they have confidence. It is suggested also that where the cases appear to be due to drug addiction, they may well be reported to the nearest public health officer. Such a report may assist in exposing an illicit drug ring and, if it is a case of early insanity, the person may well be watched with a view of segregation before violence is done.

Wanted.—Many short notes, from 3 to 20 typewritten lines, to fill such spaces as this.—Editor.

⁶ Rosanhoff, Aaron J. *Manual of Psychiatry*. 5th ed. N. Y. John Wiley. 684 p. 1920.

METHODS AND TECHNIQUE.

The Arrangement of the Collection.

Of course, every collection should be arranged so far as possible in the evolutionary or taxonomic order of the Orders, Families, Genera and Species, with the subdivisions of each properly placed if known. Yet, even though it be carefully done, there may be a residuum of unplaceable forms, which, of course, should be put as nearly as possible in what we consider to be their real position. At this point, a question presents itself. Shall the collection be arranged faunistically throughout? Or only taxonomically?

My own practice is a pure, straight taxonomic arrangement, according to a standard catalogue. If we restrict ourselves to one region, we should follow the latest authoritative catalogue so far as the higher groups go, with the lesser groups arranged in accordance with the most recent monographic work. This, in the end, works out faunistically, at least in the Heteroptera. Here entire families occupy restricted faunas, as the Scutelleridae, for example, which are confined largely to tropical and subtropical Africa, Asia and America; and in which the genera are largely faunal aggregations. This is also true in the Notonectidae, for example, in which the genus *Enithares*, with one exception known so far, is Old World in distribution; or the genus *Anisops*, which so far as we know, is also Old World, while the genus *Buenoa* is confined to the New. In other families, also, we find restriction of habitat and therefore of fauna. Many other instances might be cited, but these are sufficient to illustrate the point.

Arrangement by a standard catalogue has a further advantage. If the insects are arranged in the linear order of the catalogue, it is possible then to note on the box—on the outside—the *page number of the first genus in it*. Thus, the index of the catalogue becomes the index of the collection, without having the necessity of listing the genera on the box label. It is thus easy to find any genus at any time with a minimum of trial-and-error.

A collection so arranged permits endless expansion, by simply intercalating a box here and there as needed, with only the family name and the page number on the label.

Arrangement of the Library.

The purpose of an entomological library is necessarily ready reference. It should be possible to go to it without consulting a card catalogue with a system of cross references, which may or may not be complete.

The working entomological library, particularly the private library, should therefore not be arranged strictly according to authors. It consists (or should consist) of general and special works, with a *very* few journals. Journals, even the best of them, are costly and hard to consult. *Biological Abstracts* should be in every working library; and then one or two journals which carry a large proportion of matter on the student's particular group. But the mass of such a library should consist of monographs and reprints, which are relatively less costly; and which contain only what is wanted in the least possible bulk, thus saving precious room.

Now, how to arrange the library? Bound volumes, of course, go on shelves. General biological works should go first, grouped together. Then general entomological works, general works on the group or groups, faunistic works, followed by the lesser categories. Pamphlets, monographs and reprints of one kind or another are best kept in standard pamphlet cases, which may be placed among the bound volumes in their proper positions, if on general topics. The division of other pamphlets should be: First, general topic of the group; second, biological matter; third, taxonomic matter, including general synonymic matter; fourth, anatomy and morphology; fifth, palaeoentomology, general and special; sixth, faunistic work, classified into faunas; seventh, the families seriatim. In my own library, general works are divided into those on the land forms and those on the aquatic forms, when such division is possible. The families are then arranged by authors, and so, of course, all the other monographs and reprints on one subject or another. Standard manila folders should be used in the cases for the families; and where an author has produced much, his pamphlets should also be segregated in a folder.

Under these conditions, only one card index is required—namely, a straight author index, of which there are many forms.

This plan I have worked for years and have found very satisfactory.

J. R. DE LA TORRE-BUENO,
Tucson, Ariz.

Have you a short note?
Send it in right away!

BOOK NOTES.

Entomology with Special Reference to Its Ecological Aspects.

By J. B. Folsom, revised by A. R. Wardle. Fourth Revised Edition with 5 plates and 308 text figures; pp. i-v + 1-308. (P. Blakiston's Son and Co., Philadelphia, Pa. \$4.00.)

Here we have one of our standard works on entomology brought to date by a competent hand. Needless to say, in the 11 years since the 3rd edition appeared, Imms's monumental work has come out in three editions, which synthesize much of the preceding fragmentary and disconnected work of recent years. In the meantime have also appeared Hemiptera of Connecticut, Hungerford's Biology of Aquatic Hemiptera and any number of biological studies of aquatic Hemiptera by his students. (Incidentally, for no discernible reason none of these appears in the bibliography.) Much new light has also been cast on ancient problems by monographic and other work, particularly in the lines of morphology and ecology, most of which is reflected in the pages of this new edition. No attempt is made in the current note to draw comparisons between this edition and its three predecessors, since each practically stands alone as an advance on the one before.

The fourteen chapters cover an elementary study of classification, anatomy and physiology, development, adaptations of aquatic insects, color and coloration, insects in relation to plants, to other animals and to disease; the interrelations of insects; insect behavior, distribution and ecology; and insects in relation to man; all in 545 pages. The bibliography fills 32 pages, to p. 577; and there is an author index and a subject index. A curious thing stands out both in the bibliography and the author index—this is the absence of the names of workers on the Heteroptera, such as H. G. Barber, H. M. Parshley, H. B. Hungerford and others whose names will occur to our readers familiar with the literature of heteropterology. Even so great a name as Reuter is mentioned only once; likewise E. P. Van Duzee, who is mentioned for his Catalogue alone. Obviously, not only do the Hemiptera continue to be the most overlooked group of insects among general entomologists, but they are likewise overlooked by so competent a general entomologist as Dr. Wardle.

However, in spite of this reviewer's personal prepossessions, as above, this still continues to be a great work, aside from the fact that it is the only work of its kind in the English language.

Those that possess the other editions should also own this; and everyone interested in the problems of entomology must have it.

J. R. T.-B.

EXCHANGES

This one page is intended only for wants and exchanges, not for advertisements of articles for sale. Notices not exceeding THREE lines free to subscribers. Over lines charged for at 15 cents per line per insertion.

Old notices will be discontinued as space for new ones is needed.

COLEOPTERA.—Am interested in exchanging Coleoptera. Carl G. Siepmann, R. F. D. No. 1, Box 92, Rahway, N. J.

DIURNAL LEPIDOPTERA.—Have many desirable western species to exchange, including *Argynnis atossa*, *macaria*, *mormonia*, *malcolmi*, *nokomis*; *Melitaea neumoegeni*; *Lycaena speciosa*; etc. Send lists. Dr. John A. Comstock, Los Angeles Museum, Exposition Park, Los Angeles, Calif.

CATOPINI: *Catops* (*Choleva*), *Prionochaeta*, *Ptomaphagus*.—Wanted to borrow all possible specimens of these genera from North America for a revisional study. Correspondence solicited.—Melville H. Hatch, Dept. of Zoology, Univ. of Wash., Seattle, Wash.

HISTERIDAE—Desire to obtain material, all localities, for identification, by purchase or exchange of other families. Chas. A. Ballou, Jr., 77 Beekman St., New York, N. Y.

LOCALITY LABELS.—60c per 1000, 5 in strip, 1 to 3 lines. 5 sizes type. 3½ point, 75c per 1000. Good heavy paper. Prompt service. A. L. Stevens, 691 Culver Rd., Rochester, N. Y.

BUY OR EXCHANGE: Pinned Microlepidoptera and papered Pieridae of North America. Full data with all specimens. Named material of all groups offered. Alexander B. Klots, College of the City of New York, New York City.

WILL COLLECT for cash all ORDERS OF INSECTS, providing I receive sufficient orders prior to collecting to justify my proceeding. Have many specimens in stock at all times for sale. Louise Knobel, Hope, Arkansas.

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